AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

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For Sale Everywhere by Newsdealers.

ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

New 24-Inch Shaper.

The engraving represents a 24″ shaper manufactured by Lodge, Barker & Co., Cincinnati, O., in the design of which a good deal of care has apparently been taken to give stiffness to resist strain of cutting tool. The machine has also greater range in nearly every way than many machines of its class.

It has 24-inch stroke, vertical adjustment of table of 20 inches, a cross motion of 26 inches, and tool block has nine inches of feed in any direction.

The spindle on which the driving pulleys are placed, makes 34 revolutions to one of rack wheel. This gives great power, and high belt velocity, making the movement of belts quick and easy. The vertical adjustment of table is made with worm and wheel operating a pinion working into a rack, and it is raised and lowered at the same end of cross-head, at which the operator is standing. This enables him to make every movement necessary for working the machine without altering his position, or stopping the shaper, which will be recognized as a saving of time where a large variety of work is being done, or in fact under any circumstances.

There is an open space under the ram that admits long lengths of iron clear through; this is very convenient for cutting keyways in shafts of any length, and up to 4″ diameter.

The slide, holding tool box, is detached, and a tool, 1½ inch in diameter, inserted in end of ram, for cutting keyways in pulleys, wheels, etc., the feed motion being obtained by moving table upward.

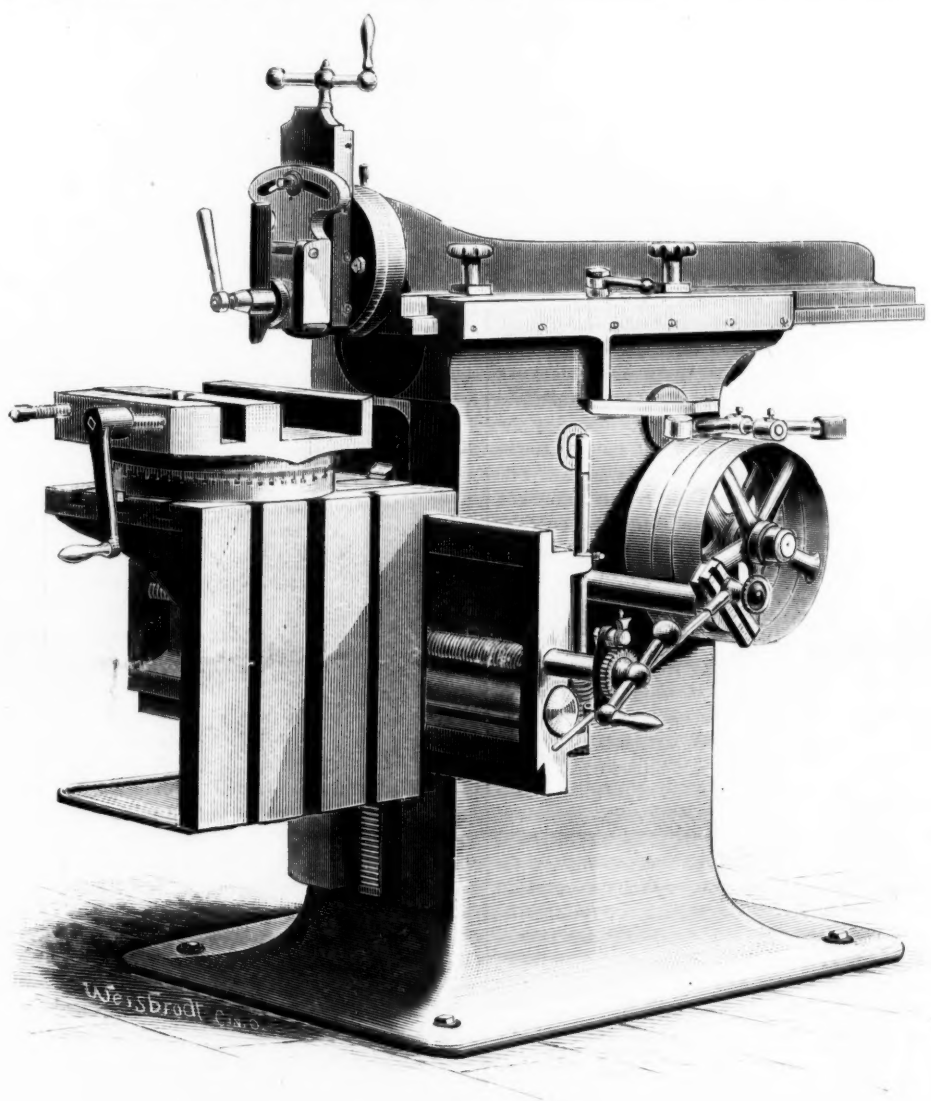
When the ram is at the end of the motion of 24 inches, it has a bearing in column slides of 30 inches.

The workmanship and material of this tool are first-class, great pains being taken to insure accuracy.

The countershaft is furnished with two changes of speed, and back motion of ram may be made two or three to one as desired.

Vise, wrenches and countershaft, are furnished with each machine, and circular attachment when desired.

Weight of machine, 2,600 lbs.



NEW 24-INCH SHAPER.

Mr. Webb, of the London and Northwestern Railway, calculates that 1,400 pounds of steel disappear by wear every hour from the rails of 1,780 miles of road operated by the company.

American advocates of free trade try to make out that, by some undefined operation of economic legerdemain, the opening of our ports to the free importation of cheap foreign-made manufactures will not injure our native industries. John Bright, the greatest living apostle of the Cobden trade principles, has recently been speaking on free trade, and his plain talk must be rather embarrassing to his American followers. He plainly says that the American farmer ought to be permitted to exchange his corn for the products of British factories without tariff restrictions. When this international reform comes round, Mr. Bright anticipates that prosperity and plenty will return to British manufacturing centers. But in what kind of a condition would this leave American manufacturing centers? Trade economists reply: Send your distressed artisans to till the prairies that yet remain unbroken. The price of wheat seems to indicate that the tillers of the soil are too numerous already and competition as sharp as in other occupations.

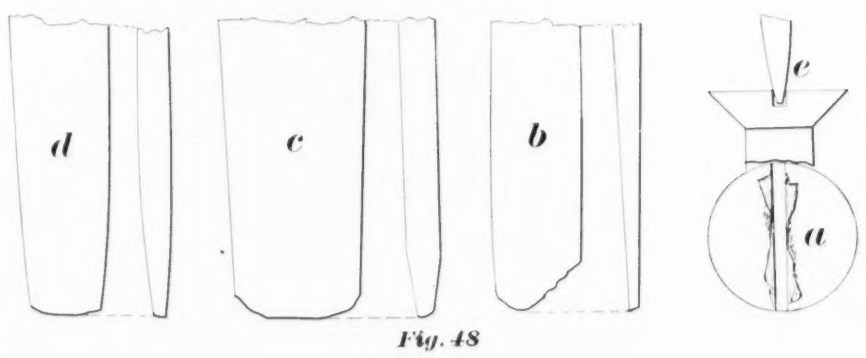


Fig. 48

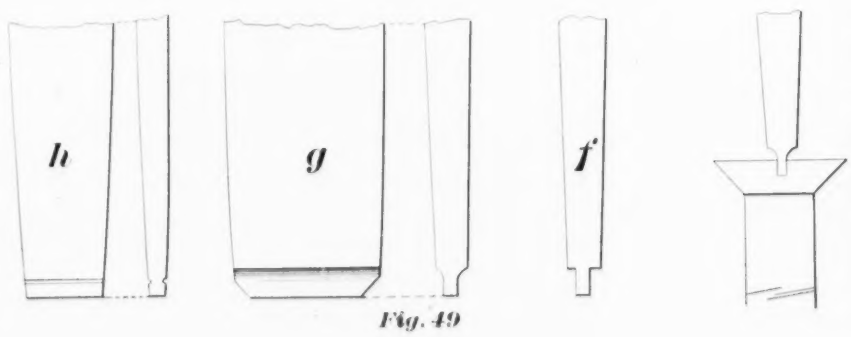


Fig. 49

About Screw-Drivers—Oil-Stones—Blacksmith Tongs—Ancient Iron—Welding Iron and Steel.

BY JAMES F. HOBART.

John Striker runs a little machine shop. He makes saw-mills, and repairs sewing machines and wagon axles. Once in a while John turns out a *machinist*, too. None of the dude genus, either, but a machinist that can do a job of planing in the lathe; turn true shafting in the old "home-spun" lathe that runs clear across one end of the shop; and is not afraid to tackle a nice job if it happens along.

I dropped into his shop one day. I always take to such shops. I find ideas there. John Striker's shop seems to have a whole row of ideas, all sitting upon a shelf which runs around the shop. When anybody gets "stuck," one of these ideas tumbles down in a hurry. Striker's ideas don't hang around the big shop. There is no place for them to hide in. The draftsman has got some of them piled up in the office, but they are all gilt-edge, half-calf, tinted-paper, high-toned ideas, that will not do for the machinist to handle or the moulder to ram up copes with. In Striker's shop, that shelf is piled two feet high with cores for babbitting boxes, special rigs to turn a lathe into a milling machine, or a planer into a gear cutter, and the drill into a slabbing machine, but there is an idea hidden in every crack and crevice of that dusty, nameless collection.

Just as I came into the shop, Striker's youngest cub was wrestling with an old sewing machine, which had come in for repairs. Jimmy was trying to start the big ⅜″ screw which held the arm. It was rusty, and would not come out. Jimmy tugged twisted, and turned—it still held. He put a monkey wrench on his little 6″ screw driver, and tried again. He took a chunk out of the screw just like *a*, Fig. 48.

Just then an idea came down off the shelf, and Jimmy thought, "That screw-driver don't fit; might just as well have a cold chisel." And then Jimmy went all around the shop and found six screw-drivers. They had been used for everything but driving screws—for wedges to pry caps off boxes, to scrape off rust, and to hold bolts from turning around in bad corners; *b*, *c*, and *d* are fair samples of Jimmy's screw-drivers, and we all recognize them as old acquaintances.

"Guess I'll go and make one," said Jim. "Make it two feet long," said the Idea; "you cannot hold a screw-driver perfectly still and true when you are twisting on it for all you are worth. You are sure to move the end of it two or three inches, and that gives it a chance to jump out of the slot and damage the head.

"It don't take much to make it jump out when it fits like *e*. The harder the pull, the more apt to jump out. When the screw-driver is two feet long, a movement of two or three inches does not cant the screw end but one-fourth as much as with the 6″ driver,

and that's the reason the old fogies say a long screw-driver has more power than a short one."

Jim hunted up an old 18″ file and ground all the teeth off. It is no use to make anything out of a file unless the teeth are *all* ground out; cracks start from bottoms of the teeth and run into the steel. No use to try and hammer the teeth out; they *stay*, no matter how much the steel is worked.

"Don't alter the shape of the file," said Idea; "just let it go, and cut the shank into the ferule on the handle." Jim ground the end on an emery wheel until it looked like *g* Fig. 49. "Don't leave it like *f*," said Idea; "it will break if you do. Leave the corners rounding. Don't ever leave a square corner where you can make a round one. Every time you are finishing corners or the intersection of two planes, just spread out your hand and see the nice curve which joins one finger to another. There's a pattern you can always follow."

Jim finished up the screw-driver and went down-stairs to temper it. "Look out," said Idea, "don't get it too hard. Better have it too soft than a little hard. It has to bear a shearing strain, and will break like a pipe stem. Run the temper clear down if you must temper it, but we don't often temper a screw-driver at all. We want it so we can file it, and it will stand, unless for very hard usage."

A screw-driver like *d*, Fig. 48, may be made to do good work by filing a notch in each side, like *h*, Fig. 49. It will not slip out, but is very apt to break off where the crease comes.

Jimmy put his new screw-driver in the screw. It was just a fit. He could not start the screw, then. It stuck hard. "Rap it," said Idea. Jimmy hit the screw with a peen hammer. "Hold on," said Idea, "you will knock the head off, and then you'll have to swear the screw out. Put a little piece of steel in the slot and strike on that." Jimmy hit it a couple of times, put his screw-driver in again, put on the monkey wrench, and that screw came out in a hurry. He found he could pull pretty hard on the wrench and the screw driver did not offer to jump out of the slot, as it did when made as at *e*, Fig. 48.

A screw-driver like *g* will be kept for a screw-driver. The first man who tries to pry a box apart with it will "darn the thing," and throw it down. They make first-rate screw-drivers, but aren't worth a "continental" for "general use," like those marked *c* and *d*. The boys wont split the handle off by using the thing as a wedge and driving it in with a hammer.

Keep your oil-stone clean. Many users of oil-stones keep them full of oil all the time, all covered with dirt and gudgeon-grease, and when they want to use them, must scrape a place with a chip before they can make the tool "take hold." Wipe the stone clean after using. Do it every time, too, not once in a while. Get in the habit of it, and it will come natural.

Don't let a stone get gummed up. If you have been guilty of keeping such a one, just take a new deal and "try out" your stone. Put it in a kettle with water and potash—some soapine will do first-rate (and soapine should be kept on the sink of every shop in the land)—and set it over a fire, or stick a steam pipe into it. Boil for an hour or two, then soak and wash well in clean water. You will then be able to see what your oil-stone looks like, and it will "take hold" like a new broom.

Some men place their oil-stones in the sun and let the oil try out. But the potash is the best; it "kills" the grease on the spot.

An oil-stone needs "truing up" very often. I remember, when a boy, of truing a stone. Our worthy father set us at the job of rubbing the stone on a board covered with sand. How slow it did cut! It generally took two or three hours to do the job. Every three or four "rubs" I would have to examine to see if it was "most done;" and then before I got to work again, Tim Blodget would come along and try to argue me into "goin' fishing," and then how I hated that oil-stone.

Don't let a stone get too "hollowing." Use long strokes in rubbing a tool upon it. If it gets a little worn in the center, take it to the grindstone or a big emery wheel. Hold it against the *side* of the wheel, not on the face. It will take but a very few minutes to grind the oil-stone true and smooth.

I never yet saw a loafer hang around a shop half-an-hour without getting out his jack-knife and "going for it" upon the middle of an oil-stone. If I have a knife to sharpen, I do it near the *end* of the stone. The ends don't wear down; it is the middle that gets most of the work. Some journeymen put a wire across the middle of their oil-stones. They have to work each side of it, but the loafers have to, too.

If you break a stone, don't throw it away. If thick, or nearly new, boil the grease out of it, and *glue* it together with common glue. It will hold if you get all the grease boiled out before you put on the glue. If the stone has become worn pretty thin, you had better grind it down into slips. It will make some nice ones of the very best quality.

Don't put the stone into a block of wood. It makes a nasty thing to keep clean; go to the hardware store and buy a nice oil-stone holder. You can put it on in two minutes, and take it off in "no time," and wipe the stone clean as often as you wish.

A hard, glossy oil-stone is not worth buying. A stone which looks like a piece of marble is good for nothing. A stone with a sand-stone complexion is too soft, and will work bad. The "muddy" stone is another to be avoided. Somewhere I have seen a receipt as follows: "Draw your thumb nail along the stone; the faster it cuts away the nail the better the stone." It looks reasonable, but I have never tried it.

Petrified wood makes the best oil-stone. I have a Scotch stone which cuts very fast, yet will set an edge to "cut a hair." Some years ago a firm started to manufacture "silex" stones for oil and water, both hand and power. The "silex" stone was ground fine, mixed with some secret "uniting compound," and moulded under hydraulic pressure. The stones thus produced were pretty good, but were apt to "glaze," and then neither oil nor water seemed to have any effect in removing it. Whether or not they are made now, I do not know.

There is a knack in using oil-stones well. Don't rock your hand and make six or eight bevels on the work, or else make a curve in place of a flat "bevel." Keep your wits upon the top of the tool, and see that it travels as fast as the bottom edge does. The tendency, when pushing from you, is to lower the top of the tool, but a little attention to this point will enable a man to do a job right, and get a better edge in the very shortest time.

I always liked to hang around a blacksmith shop. There seems to be lots of pure science in the dirty, dusty old shanty. When I attended the "district school," during three months of winter and three feet of snow, I always used to go to the blacksmith shop to eat the dinners I carried. With toes in the ashes and head in the smoke, I could eat bread and butter and flying cinders with relish. If the smith went out, leaving a nail rod in the fire, I could keep it just black hot, and then change ends with it just before he came back.

The tongs a smith will keep in his slack-tub would set Barnum crazy. Some with one leg, some minus a jaw, others in every conceivable state of demoralization. A smith hates mortally to relay his tongs; he will let them go to the last moment, then drive out the rivet, weld a piece to each jaw, and fit up again. This takes too long. Just forge two pieces of iron the right size, cool them, put a piece of thick, wet card-board between, take hold of them with the tongs, and weld up tongs, paste-board, iron and all They will not stick where the paper is; you can't make them. The iron may lap over and the outside stick a trifle, but a tap from a cold chisel makes them fly right open, and the tongs are ready for work. No pin to put in or take out, all done at once.

A couple of old scythes will make the best tongs you ever took in your hand. There are three kinds of stock in a scythe—very good iron, low steel, and a little nice cast steel. Double the scythe back and forth until it is about eight inches long, weld it up, and you have a piece of stock that can't be beat. Split open one edge of a piece; lay in a piece of cast-steel, weld it up, and you can make a knife that will beat Davie Crockett's three laps in a mile.

Sometimes a chap brings into the shop a piece of American iron made before the revolution, or just after. It is only found now in old iron bars and square shafting from the backwoods grist mills. It is a job to weld it. It is full of sulphur, and, when hot, smells like a striped snake. It *can* be welded; so can malleable iron, and the "Groton iron," as it is called in north-east Massachusetts, needs to be treated just like malleable iron.

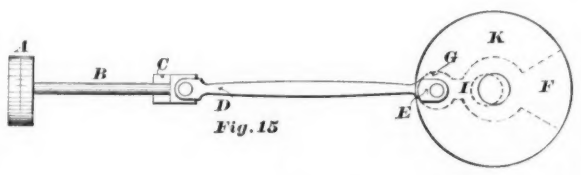


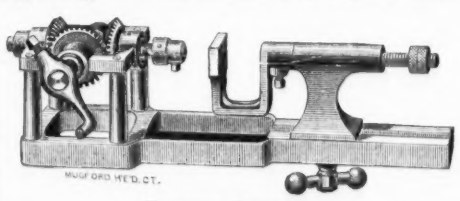
Fig. 15

Scarf the joint and rivet it together, and mix Norwegian iron filings and powdered borax, and use for a flux. Strike light blows at first, work easy, and you can weld cast iron. A similar result can be obtained by placing a piece of Russian iron stove-pipe in the joint before it is riveted. Steel can be welded at a fluxing heat by playing this dodge upon it. Whenever I have occasion to weld steel upon the end of a big shaft, I put a piece of nice, clean, Russian iron upon the steel, heat the steel in one fire, the shaft in another, and just as the sheet iron melts, or gets to a welding heat, place it upon the end of the shaft *in the other fire*, strike it two or three times with a short piece of shafting, take to the anvil, and let the striker go for it with his sledge.

Take a good heat on the shaft, and no matter if it is a big 6″ one, you will get a good job every time. The thin, clean iron will make a good weld. If you lose one end of a weld and are obliged to take another heat, just put a piece of soft iron or clean iron filings in the joint, and see how it will "stick."

Tapping Device.

This is designed to meet the wants of those who are not disposed to pay the price of an expensive machine for the purpose. It can be used on any lathe, being mounted on the centers and driven by a dog, as shown in the engraving, or it can be used with a crank as a hand machine. It will tap holes from ½″ down. It is particularly recommended by the builders for the use of manufacturers of fire-arms, sewing machines, electric lamps, clocks, locks and general hardware. By its use parts of such work can be tapped with rapidity and accuracy, and when the device is not in use it leaves the machine in which it is mounted free for other purposes, as it can be laid away where it occupies no room that could be utilized for placing other tools. This makes it convenient for small shops where such a tool would be in use but part of the time, and where room is a valuable feature.



TAPPING DEVICE.

The weight of the device is about 30 lbs.; height from bottom of bed to center of spindle, 5¼ inches.

It is manufactured by Woodward & Rogers, Hartford, Conn.

Balancing the Reciprocating Parts of Steam Engines.

BY FRANK H. BALL.

I have been looking for some reply to my article on "Balancing the Reciprocating Parts of Steam Engines," which appeared in the AMERICAN MACHINIST of January 3d. Being a direct attack on the theory advanced by Mr. J. C. Hoadley in a previous article on the same subject, and so diametrically opposite in every conclusion, that one theory or the other must be totally false, it is desirable, in the interests of science, that the truth on the subject shall be known. As the matter now stands the mechanical world have, on the one hand, the assertion of Mr. Hoadley, a mechanical engineer of national reputation, backed by the repeated assertions contained in a pamphlet published by the Defiance Machine Works, of Defiance, Ohio; while on the other hand stands only the article of January 3, referred to, from a comparatively unknown authority, and purporting to be a demonstration of the error of their theory. I think it but just to say, however, that Mr. Hoadley's statement being only an incidental one, ought not to subject him to very severe criticism. His mistake was in too hastily accepting the assertions contained in the pamphlet referred to, an elegantly written work, but, in my opinion, most elaborately false.

Notwithstanding that this book is claimed to be the result of extended and costly experiment, I will stake my little reputation right here on the assertion that it contains more error between its covers than any other mechanical work now in print, and yet it is in its sixth year, having reached its second edition in 1881. A remarkable feature of this book is the fact that not a single demonstration appears on its pages. It reviews the demonstrations of truth by eminent mechanical engineers, and then annihilates them with a breath, by simply branding their demonstrations as false, and "not worth the dignity of an analysis." This is particularly the case in regard to the balancing of the reciprocating parts of steam engines.

The following is its theory on the subject, using the exact language and reproducing the cut used for illustration: "The reciprocating parts of an engine cannot in any degree be balanced by a counterweight in a rotating part. If *F*, Fig. 15, be of greater weight than the sum of *G* and *E*, there will be a striving of the journal to run in the path indicated by the dotted circle, *I*, and instead of mitigating the shock of *A*, *B*, *C* and *D* at the end of that stroke, it will aggravate it."

Here we have the theory, that weight applied at *F* will throw the shaft toward the light side, and aggravate the shock of the reciprocating parts. In other words, this is a case where centrifugal force acts toward the center, and not away from it, in the time-honored way.

This may be the result of costly experiment in Ohio, but it don't work that way in Pennsylvania.

I recently had occasion to make some experiments in counterbalancing engines at high speed, and began by applying a weight equal, at the radius of the crankpin, to the weight of crank and pin and the end of connecting-rod which revolves with them.

Upon speeding up the engine, which stood on a reasonably good foundation of brick and cement, a terrific shaking ensued. Supposing the foundation to be at fault, I introduced a strong brace between the cylinder-head and a massive brick boiler-setting, when it became apparent that I was shaking the whole western end of the State. Contrary to the assertion of the Defiance people, I found that additional weight of counterbalance reduced the shaking, and when a point was reached where the engine would remain immovable on the foundation without any bolts to hold it, I found, by weighing the counterbalance, that it just equaled the weight of crank and crankpin, together with the total weight of the reciprocating parts.

I am glad to be able to say that centrifugal force seems to produce a very similar effect in New York State. Mr. David Payne, of B. W. Payne & Sons, of Elmira, furnished the writer with the result of a similar test at their works, except that he employed the additional refinement of placing the engine upon rollers and connecting with a flexible steam pipe. When the smallest amount of horizontal shaking was observed it was found that he had exactly balanced all of the rotating and reciprocating parts. Will the Defiance people reconcile this with their theory?

Among the many obvious errors of this book we find it stated that an unbalanced rotating disk will spring the shaft in the direction of the light side, which is part of the same false theory. Let any mechanic who reads this satisfy himself in a moment, without "costly experiment,"

Place a disk or flange of any kind near the middle of a mandrel of some length, and, swinging it on the centers of a lathe, see that the mandrel runs true. Now attach a small weight to one side, and, setting the whole to revolving rapidly, approach the mandrel near the disk with a sharp tool and notice whether it is sprung toward the weight or away from it. In doing so, don't let the weight fly off and break the lathe, as I did.

It is amusing to notice how many conflicting things the experimenters of this book found, and how many things were to them unknown, etc. For instance, we read as follows: "The degree of velocity at which a striving to rotate upon its center of gravity, begins in a rotating body, cannot be determined by the progress at present attained."

I should say not. Decidedly so. When this point is reached, and centrifugal force acts toward the center of motion, I would prefer to stand from under, as I should look for gravitation to become a repellent force, and all the laws of nature to become badly mixed.

Again we read: "The constraints and impulses by which centrifugal whirling of the axis is rendered possible bring into existence forces which at present defy computation."

This is undoubtedly true with a capricious centrifugal force that acts away from the center at one speed, and toward it at another, as there would be no calculating it. Evidently there would be a medium speed at which the forces would be neutral, or of no effect. (What a happy medium this would be for emery wheels!) If one accepts the theory that centrifugal force acts always from the center, and always directly as the distance of the center of gravity from the axis of rotation, and always directly as the square of the number of revolutions per minute, there need be nothing to defy computation. It may be very appropriately said that a false theory doesn't fit all the facts that surround it, and hence the necessity for something that "defies computation," and "that cannot be determined by the progress at present attained."

Will the Defiance people kindly come to the rescue of their pet theory, or will they by their silence admit to the mechanical world that their ground is untenable? If so, will they call in their books and cease to scatter error under the guise of truth? If they wish to reply, will they first review my article of January 3, and point out a flaw in the demonstration that under no circumstances does the center of gravity of a rotating body seek to coincide with a fixed axis of rotation not coincident with it, as the contrary assertion is the foundation on which they build their fabric.

Reed's No. 2 Plain Milling Machine.

The engravings represent one of the sizes of this machine, recently put on the market by F. E. Reed, Worcester, Mass. The features of the machine are very clearly shown in the two views. It is designed for heavy work.

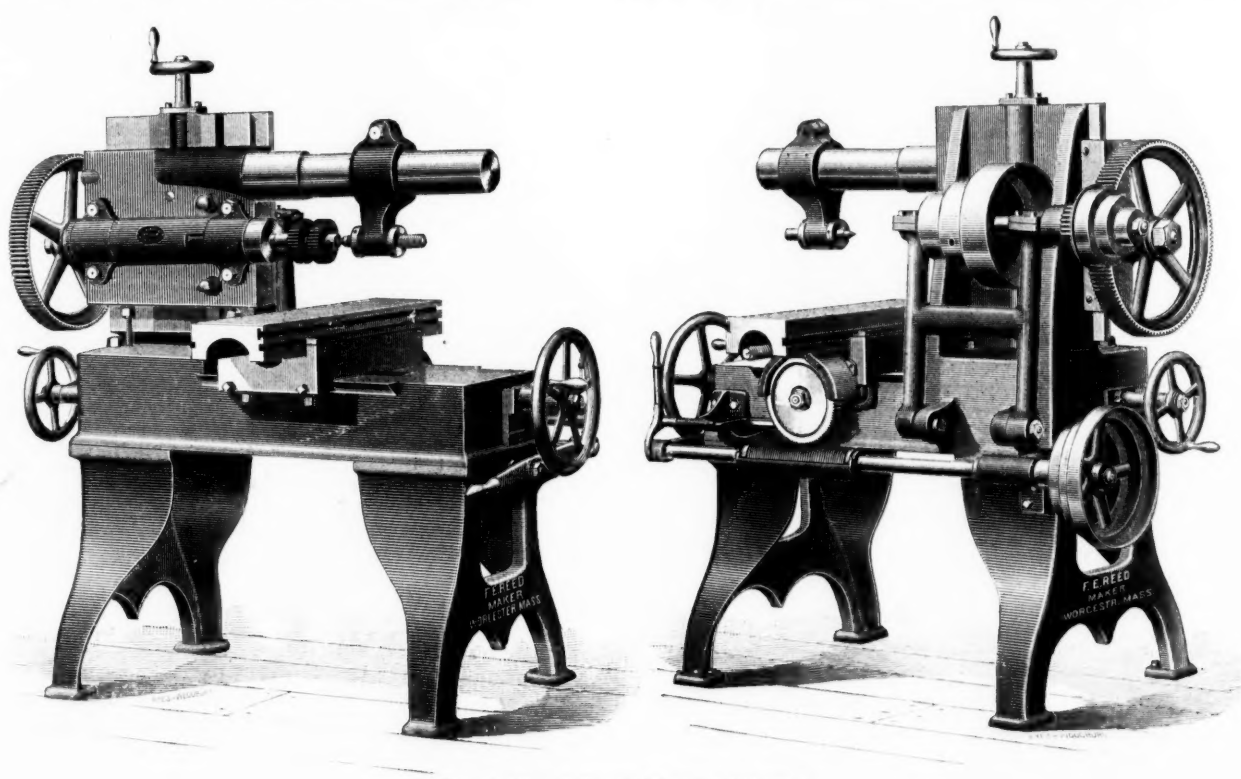
The bed is 16¾″ wide and 6¾″ deep.

The spindle, of hammered steel, is mounted on a heavy square slide, which is gibbed to both sides of the upright, and raised or lowered by a single screw and held in position by ¾″ bolts. A stop screw is provided under each slide. By this arrangement rigidity and accuracy are secured.

The spindle gear is 16¾″ in diameter, and the driving gear on cone shaft is 4″ diameter. The gears are connected by means of a yoke, and are not thrown out of gear by adjustment of spindle.

The table is 33¾″ long and 7″ wide, and has automatic feed motion, adjustable at any point.

The spindle has vertical adjustment of 8″.



REED'S NO. 2 PLAIN MILLING MACHINE

The countershaft has tight and loose pulleys 12″ diameter, and should run 125 revolutions per minute.

When desired, the machine is furnished with foot-stand instead of center arm, for center support.

Prospects for Mechanics in Georgia.

Robert E. Masters, foreman of the foundry of the Columbus (Ga.) Iron Works, writes us:

"I have received so many letters of late from mechanics in the North inquiring about positions, locations and the state of trade South, I have concluded to answer all through the AMERICAN MACHINIST, as it was through that medium they learned my address.

"Mechanical as well as other branches of trade South are in very much the same condition that they are North at the present time, and I would not advise any mechanic who is out of work to come South just now. It costs considerable money to travel looking for employment, and, unless a man has a position secured in advance, he had better remain at home, for what money he would spend in traveling a very short time would keep him comfortably several weeks at home.

"It is not advisable for the most expert mechanics, even in more favorable times, to leave a field in which they are well known and appreciated to go into a locality where hey are unknown, unless they have good prospects ahead of bettering their condition. The AMERICAN MACHINIST of late date contained some sound advice on this question, especially regarding workmen going on the promises of unreliable parties to New Orleans. From information I have from friends there who are posted on mechanical industries, the supply is far greater than the demand.

"To those who have written asking about locations to start jobbing and repair shops, I feel safe in saying, when business revives a little, they could find better openings than they could in the North, for this reason: This country is getting filled up with portable engines and saw-mills, and machine repair shops are not to be found in every town as they are North. The president of these works has on two occasions very kindly offered mechanics who have written to us this winter positions for a while, so they would not lose anything in looking around for a place to start business on a small capital."

A Barber Machinist.

The following unique advertisement, clipped from a local paper, shows a refreshing spirit of progressiveness quite at variance with the adage that confines the cobbler to his last:

D. E. HARRIS,
FASHIONABLE
BARBER,
ALSO,
First-Class Machinist,
RAVENSWOOD, WEST VIRGINIA.

Those having Sewing Machines, Engines, or any kind of Machinery, which needs repairing, should give him a call. Shop on Washington St., one door north of Denoon Bros'. Drug Store.

The correspondent who sends the above wants to know if the advertiser had a cylinder to bore out and a job of hair-cutting to do, which would he do first? We should say neither, of course. He would put the fine feed on his boring bar—soldier—and slash off the hair while the cut was going through the cylinder; then charge up the whole job to the party most likely to pay. It might be a little rough on the man who had his hair cut, but business is business. We commend this advertiser's forethought to proprietors who have tried, without unlimited success, to get rich running a machine shop on general jobbing. When it comes to *shaving* a customer who always wants ten dollars' worth of machine work right away for nine dollars in money next fall, any level-headed proprietor ought to be able to get even with him, so far as mental considerations are concerned.

How a Mill-Owner Learned to Respect the Indicator.

The President of the Fishkill Landing Machine Company relates an instructive incident, showing the manner in which a New England mill-owner acquired a healthy respect for the performances of that, to him, mysterious and over-rated instrument, the steam engine indicator.

The local inspector of the boiler insurance company finding the boiler was getting a little old, ordered its pressure reduced from 70 to 60 lbs., but the mill-owner said it would not do his work at that pressure. Applying to the Fishkill concern for advice, use of the indicator soon showed them that the old-style engine used in the mill was wasting coal, and that a new engine would permit four or five years' further use of the boiler, at which time replacing the boiler would make the entire plant substantially new. Skeptically pooh-poohing the idea that such a little, new-fangled contraption as the indicator, would tell truthfully what was claimed for it, the mill-owner finally accepted the engine-builders' guarantee, that a certain saving in coal would result, and a Fishkill-Corliss was ordered. Before the new engine was set in place all the coal used in the old engine was, by agreement, carefully weighed for several weeks, and a record kept.

A similar record was afterwards kept of the amount of coal required to run the new engine, demonstrating that the latter was effecting a net saving in coal of $12 per day. The mill-owner now figures that the new engine doesn't owe him anything, and the balance keeps on inclining to the right side of the ledger. He is at present exercised over the query, whether he is more indebted to the Hartford inspector, who first put him on his mettle, the engine-builder who gave him such satisfactory advice, or the inventor of the truth-telling but despised little instrument, whose pencil, after all, pointed to the right place, viz., his pocket.

Personal.

Mr. Reuben Wells, who has been for many years superintendent of machinery of the Louisville & Nashville Railroad, has been appointed general manager of the road. Mr. Wells was for six years president of the Master Mechanics' Association, and retired from the position last year at his own earnest request. He has appointed as his successor, in the locomotive and machinery department of the Louisville & Nashville Railroad, Mr. James Boon, who has lately been on the New York, West Shore & Buffalo Railway. Mr. Boon has been a prominent master mechanic for years, and his numerous friends will hear of his elevation with pleasure.

How many less unemployed men there are in the country than on the first of January is purely a matter of speculation. But it is a pleasure to be able to say that the number is very materially less. Every week iron works and manufactories that have been idle are starting up, giving employment to men that have been living in enforced idleness. Business of all kinds is slowly but surely improving. Nothing is to be more desired than that every man desirous of working shall find remunerative employment.

LETTERS FROM PRACTICAL MEN.

"Tool Dressers' Prejudice Against American Steel."

Editor American Machinist:

Under the above heading, in your issue of January 3d, W. Dicks gives his opinion "why tool dressers prefer Sheffield steel." If he is right in his opinion that the preference is because "it can be worked at a higher heat than many American brands, so that, apparently, more work can be done in a given time," then it is safe to conclude that the tool dressers ruin their case, by their own testimony. But Mr. Dicks wisely keeps his own skirts clear by saying, "Mind, I don't say more profitable work, but what better satisfies the majority of bosses and employers," thus convicting them of lack of information on the subject, if he is correct.

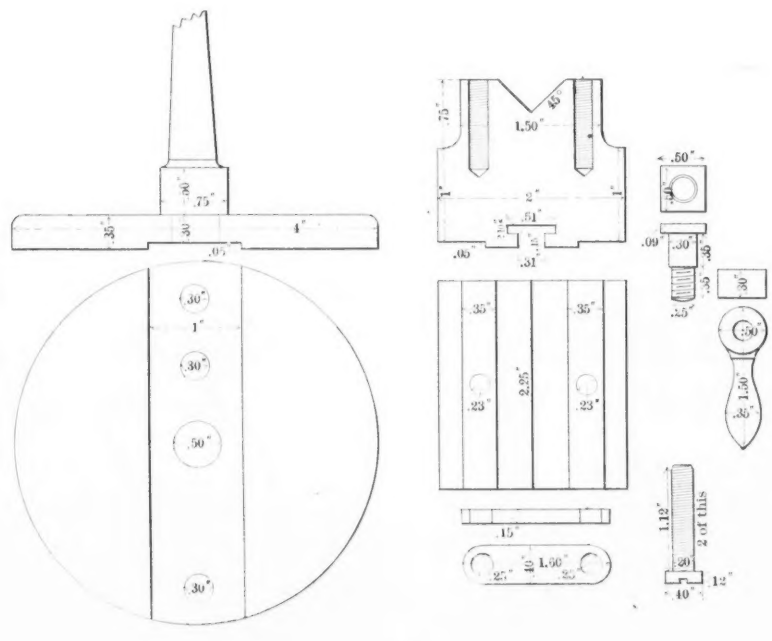
There are those still in condition to forge and temper tools, although no longer boys, who learned before American steel was known, that for certain uses, steel of high temper, which must be worked and hardened at a low heat, would do more work, better work, and in fact, would do many kinds of work which could not be done at all with the ordinary steel, which could be worked and hardened at a heat not much below that used for iron. That there is anything in the atmosphere or surroundings in America to prevent the production of steels of different tempers, varying from the lowest which will harden at all, up to that which, with the addition of a few hundredths of one per cent. of carbon could not be worked at all, cannot be true. A wide range of variety in tempers of steel, must exist in American steel as well as in foreign. But the temper is not all; quality is affected by material used, methods employed, care exercised, honesty manifested in selecting, classifying, and furnishing to consumers as near as may be, just what they need for each particular use, and above all, keeping at home all which is not good of its kind. All these and more come into the consideration of the question of whose steel to use. Does anybody suppose that all Sheffield steel is made of best material, by men so incorruptible, whose employes are so honest, that the steel must of necessity be always of the best? No. Why, of course not. All Sheffield steel doesn't bear anybody out in such a belief. Neither are American manufacturers all dishonest, and careless, nor American mechanics inferior to those of other nations, and as good material is put in steel in America as in justly celebrated Sheffield, even to best quality of "Dannemora" iron, and thousands of practical tests have shown that American steel is equally as good as Sheffield steel, being subject to all its peculiarities and varying qualities and conditions, not because it was *American* steel, but because it was *steel*. There is no reason perhaps, why an American should say that American steel is the best. There should be no American saying Sheffield steel is the best, since there is no ground for the assertion.

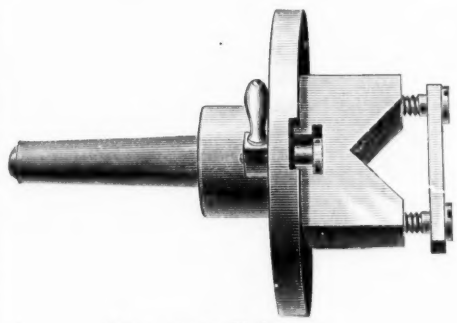
Mr. Dicks has so graphically described the office of tool dresser, his trials and annoyances, with the ground taken by employers on the steel question, that there is no occasion to quote him further, but simply to say, his description proves him to be well posted from some points of view, if not from all, on the tool dressing subject. Those of your readers who are most interested "know how it is themselves."

Jim has much such a position as other tool dressers, and puts up with—patiently or not, depending upon how he feels—all the annoyances of being urged to do a dozen jobs at once, and of having all hands, and the apprentice boys, sometimes the boss, sticking something in his fire; a nut to case-harden with prussiate, the point of a set-screw to harden, a piece to bend or flatten a little, or something you know that can't be exactly explained to Jim, not even by marking it out on the ground with a stick, or a bit of iron, or steel, or the toe of the boot, but one can do it himself in a minute. And the first Jim knows he has no fire fit to use nor a pair of tongs, nor hammer, and his anvil and vise are in use, and the only thing he has is standing room, and even at that he is pushed out of his place.

But with all Jim's trials he is gratified by having the machinist say, "That was as good a tool as I ever used. This thread tool stood to cut five or six pieces of the same without grinding, for which we used to grind a tool twice at each piece. 'Don't come very often?' No, don't have to with the tools you give me." And, beyond the simple gratification, which these compliments afford him, he sees something very practical. Longer lived tools, with less frequent dressings, mean less hurry and worry, giving time to be careful and put tools at their best; putting them at their best, and using good steel insures long life and satifactory service of tools, and knowing how to put them at their best, and what steel has shown the best results, he does the first, and asks the company for the steel.

Waterbury, Conn. S. W. GOODYEAR.





ADJUSTABLE V CENTER.

Improving the Steaming of Locomotives.

Editor American Machinist:

Lewis James, some years back master mechanic of the Manhattan Beach Railroad and afterwards holding the same position on the Wheeling and Lake Erie Railroad, has recently placed a circulating device on one of the Cleveland, Columbus, Cincinnati and Indianapolis Railroad engines, which has given some remarkable results. The engine has 16x24-inch cylinders, with 5-foot driving wheels, and has never steamed with larger nozzles than $2\frac{3}{4}$ inches. His device consists of a water leg, which is extended from the crown sheet to a point slightly below the lower row of flues. The water leg has two openings through the crown sheet, one at each side. One opening is left clear, while into the other is inserted a horn-shaped pipe whose end extends about a foot over the flues. This arrangement induces a rapid circulation of water through the water leg. In a model having a glass boiler, the horn threw a minute fire engine stream.

The practical effect of this device, when put on an engine which had been using bad water and had been cleaned of solid scale $\frac{3}{4}$ inch thick, was a complete prevention of scale, the impurities present in the water coming out at the blow-off cock as a fine dust. On the engine I saw, the nozzles were changed from $2\frac{3}{4}$ to 3 inches, and plenty of steam resulted. Whether the augmentation of heating surface by the area of the leg, or the better circulation effected the change, I cannot say. Possibly a combination of both.

The Cleveland, Columbus, Cincinnati and Indianapolis Railroad have formerly not been able to use greater than $2\frac{3}{4}$-inch nozzles with their 17x24-inch engines, which have the extended front end. They have been putting in this kind of smoke-box with a perfectly vertical diaphragm, and extending the netting only as far back as the nozzles. They used a solid plate between the nozzles and diaphragm. On the engine that Mr. James put the circulator, he also remodeled the smoke-box arrangement in the style shown in the cut. He used two diaphragms *a* and *b*. The large one extends from the top of the box near the flues down diagonally to the exhaust pipe. A smaller diaphragm, *b*, is placed lower down, and this is perforated with holes. This change was made because it was found that the lower rows of flues did all the work. By the new arrangement, the center and top flues are made to carry part of the current of gases from the fire-box. This change made a wonderful improvement, and the engine now steams with $3\frac{1}{8}$-inch nozzles.

FRANK C. SMITH.

Adjustable V Center.

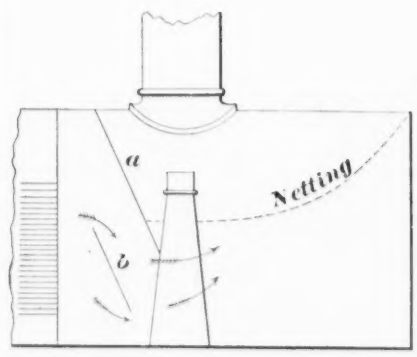
Editor American Machinist:

The accompanying cuts represents in perspective and in detail a very convenient tool. Some one will ask, what do you use it for? Did you ever make a drill chuck, and when you drilled the holes for the drift get mad, and perhaps throw it on the floor because the holes were not in line? Well, with this you could clamp the work to the V block, drill one hole, loosen the clamp, slide it along and drill another; or you can make an end mill cutter—a cheap one, if in a job shop—and cut it all out, not throw it away, but save it for some other job.

Some one may say, do this in a milling machine! Thousands of shops have no milling machine, though I am glad that many firms begin to see the value of one.

To drill collars, put a plate on end of V block, then raise or lower to the height you want.

Other places will be found where this tool will be found handy. Of course it can be used in the head or tail stock.



H. MOFFITT.

GRINNELL, Iowa.

Babbitting Planer Platen V's.

Editor American Machinist:

Last spring we erected new shops over the ashes of the old ones; did it without christening the concern the "Phœnix Iron Works," too. We couldn't, however, resist the temptation to rig up two or three of the cremated tools. One of the planers—a 36″x36″x13-foot machine, with 18-foot V's—was voted capable of again doing good service. The bed was taken to a neighboring shop and the V's planed up. It was then permanently set on its foundation. Careful testing with straight-edges, spirit level and steel lines showed some irregularities; and these having been corrected as far as possible, the fitting of the platen was next in order. At this juncture work was pressing very hard, and time could not be spared to do the job in the ordinary way, so we cut dovetailed holes, about 1″ apart, all over the surface of the platen V's; set the platen on the bed, blocked up so as to leave about $\frac{5}{16}$″ between the V surfaces; daubed some mud around and babbitted the thing. Then we set it going; it is going yet, and we wouldn't have it fitted iron to iron if it could be done for nothing. Six months' constant use has shown that it planes practically true, more so than some of the new planers. I fail to see how it can get out of truth, as nearly all of the wear comes on the babbitt, the bed V's hardly wearing at all. The planer runs surprisingly easy, and keeps oiled better than when fitted in the usual way.

E. J. ARMSTRONG.

A Bath for Tempering Steel—A Small Foundry Cupola.

Editor American Machinist:

I notice a great many articles in the different numbers of your paper about the numerous ways of tempering steel, and perhaps every one considers his to be the best. We, ourselves, have had a great deal of trouble and loss, by the cracking of valuable steel tools in tempering, and have tried different plans. To dip in cold water is too severe. Oil will not harden deep enough.

Now, we have a bath of cold water, with about two inches depth of oil on top, and with this bath we have never broken a tool. In plunging the tool in the bath, it becomes coated thick with oil before it reaches the water, which keeps the water from acting too severely upon it.

We find many good and valuable things in your paper. Among the rest was the small cupola illustrated a few weeks ago. We made one like it, 24″ outside diameter by 36″ high, and would advise putting in a deep bottom, as we have done, as it is not always convenient to lift it off its base on account of the blast-pipe connections. We made wind connection with forge fan, at very little expense. We have melted as high as 1,500 pounds in it. If we want to increase the amount, we put a few iron pulley flasks on top and make it higher. We could run three heats a day if it was necessary.

It costs nearly as much to run a small heat with the big cupola as a large one, and we find our little cupola very handy.

BENJ. F. HETHERINGTON,
of Hetherington & Berner.

Indianapolis, Ind.

Tempering Long Taps.

Editor American Machinist:

I see in one of your late issues a subscriber asks for information in regard to tempering long taps and pieces of steel, without springing them. I would advise him to make a pan as long as the part of the tap to be tempered, out of $\frac{1}{4}$″ sheet iron. Bore two holes in the ends of the pan midway between top and bottom, large enough for ends of tap to go through; fill the pan with sand, put the tap in and heat over a very hot fire, turning the tap around slowly.

H. H. B.

TARIFF VIEWS OF NEW MEMBERS ELECTED TO 49TH CONGRESS.

Letters from Most of the New Members in Answer to Our Inquiries.

There has been more or less apprehension among manufacturers and business men since the election last fall, about a possible majority in the next House of Representatives hostile to a protective tariff, and anxious to take determined action in the direction of a general and sweeping reduction. This apprehension has been increased by the persistent claims of newspapers having free trade proclivities that the protective tariff has fewer friends in the new House of Representatives than in the present House, which defeated Mr. Morrison's horizontal reduction scheme by a majority of only three. One hundred and eighty-seven members of the present House were re-elected (one of whom has since died, leaving a vacancy), and all but one or two are on record as having favored or opposed the Morrison bill. Starting with this record as a basis we determined, if possible, to ascertain the general position of the new House on the tariff by sending letters of inquiry to each of the one hundred and thirty-eight new members-elect. We sent each of them the following questions:

1st. Do you favor a protective tariff?

2d. Do you favor a general and substantial reduction of the present tariff?

Each member of the majority party was asked this additional question:

3d. Which do you most favor, the Randall or the Morrison view of the tariff?

We have thus far received replies from over ninety of the new members, which we present in this issue. They represent thirty-one different States, and express a variety of interesting ideas about the proper policy to pursue in tariff legislation. Elsewhere in this issue we summarize the information obtained in these letters of reply. Below we present the replies in a kind of miscellaneous order:

A Sound View of Protection and Surplus Revenue.

1st. Do you favor a protective tariff? I answer: In framing all tariff acts, the protection of our home labor against the competition of cheaper labor abroad should be, in my opinion, the primary object. 2d. Do you favor a general and substantial reduction of the present tariff? I do not. We have to-day a surplus in the national treasury. A reduction in the rate of duties would vastly stimulate importations, and largely increase that surplus. The surplus is not needed, and should be in circulation. Labor is now receiving a compensation lower than its actual necessities demand, and even at such rates much of it is entirely out of employment. In my judgment, we are not suffering so much from over-production as from *over-importation*. Had but a fraction of the $600,000,000 of articles imported into this country for the year ending June 30, 1884, been made, instead, in our own mills and factories, our labor here would have been employed. To further reduce the tariff is simply to further open our shelves to foreign-made goods, and to further close our own mills and factories. As an American citizen, I can be a party to no such policy.

JAMES BUCHANAN,
(*Rep., 2d New Jersey.*) Trenton.

A Randall Protectionist.

In answer to your first question, I would say that I favor a protective tariff sufficiently high to protect all industries in their infancy or that need protection.

I favor a reduction that will leave no great surplus in the Treasury, as money lying there is withdrawn from circulation.

I prefer the Randall view of the tariff, and am sure that if the "Morrison bill" had passed Mr. Cleveland would have been defeated.

CHAS. DOUGHERTY,
(*Dem., 2d Florida.*) Port Orange.

Every Patriotic American Should Sustain Protection.

In answer to your first inquiry, I declare myself in favor of a protective tariff. I believe that every patriotic American should, at all times, be ready to vote for protection to American industry and to American labor. I am opposed to a general and substantial reduction of the present tariff, although I believe that the tariff needs some revision. I agree with Mr. Randall's views on the tariff, and am decidedly opposed to Mr. Morrison's ideas on that subject.

TRUMAN A. MERRIMAN,
(*Dem., 11th New York.*) New York City.

American Labor Should be Protected.

I am in favor of a protective tariff, so far as is necessary, to protect our laboring classes and manufacturing interests. I am in favor of a general revision of the tariff, but not a general reduction. All the common necessities of life that enter into the living of our laboring classes should be taxed as lightly as possible, leaving the manufacturer a fair profit on investment, and wages for employes to live and educate their families like Christian people. Then I wish to see a law that will compel every individual, company or corporation manufacturing goods covered by a tariff to hire none but American citizens to work in such manufactories, and do away with this importation of so-called free trade labor (citizens, I mean, by birth and adoption), and, if need be, tax our luxuries higher. Our producing classes get but little benefit from a high tariff, and should be relieved of all taxation that is possible. If we have protection, let all be protected, or none. We cannot let this great Republic become a nation of lords and serfs; nor can we afford to enact laws to make the rich richer and the poor poorer.

B. T. FREDERICK,
(*Dem., 5th Iowa.*) Marshalltown.

Adjust the Tariff Every Two Years.

I am in favor of raising revenue for needs of Government by import duties, and in the adjustment of those duties I would ever keep in view the policy of protection to American industry. This country is committed to the policy of protection. It was advocated by the Fathers. It has been advocated by a majority of the leading statesmen from the earliest days of the Republic to the present time.

Looking at the question from a Western standpoint, it seems to me to be a matter of adjustment, and that to a greater or less degree the tariff should be adjusted to meet the various conditions of business at home and abroad every two years. When an industry is sustaining, and can compete in the markets of the world without a tariff, that tariff should be removed, and the struggling industries should be assisted. In short, we are past the day of theorizing upon the question. It is now a question of adjustment.

WM. E. FULLER.
(*Rep., 4th Iowa.*) West Union.

Tariff Tinkering Makes Industries Suffer.

I have your letter asking my position on the tariff. I answer: First, I am in favor of a protective tariff; second, I do not doubt that the present tariff needs some revision, but at the same time I am firm in the conviction that the great industrial interests of this country will suffer vastly more by constant and persistent tariff tinkering, than by permitting acknowledged inequalities in the tariff to exist. What is done should be done deliberately—that is, after careful consideration—and when it is done should not be disturbed until the industries of our country render it indispensably necessary.

BENJ. BUTTERWORTH,
(*Rep., 1st Ohio.*) Cincinnati.

For a Higher Protective Tariff.

I am in favor of a higher protective tariff than we have, and against reduction of the present.

WALTER L. SESSIONS,
(*Rep., 34th, New York.*) Panama.

Tariff Should Stimulate Industries and Protect Wages.

I think all will concede that successful manufactories are very important, if not essential, elements to the prosperity of agricultural interests. Certainly all will concede that in a country like ours, where we have such abundant raw material—coal, iron, copper, timber, cotton, and wool—we ought to excel all other nations in the variety and extent of our manufactories. No one will deny but that the tariff law of March 3, 1883, and the law which was repealed at that date, utterly failed to even approximate such a result. Under these laws we have not succeeded in selling the products of our factories to any extent in foreign markets, but quite the contrary. We have seen England supply the world with fabrics, and get prices for them much higher than we would be glad to sell the same articles for, while, at the same time, we have seen our home market glutted by over-production, and we have not seen factory operators enjoying steady and well-paid work; and to-day we see Bismarck recommend that the Reichstag treble the duty on American wheat, and allow it to stand untouched upon Russian cereals.

It seems to me that the tariff question should be regarded as a problem of political economy, the solution of which would be to find what laws will do most toward stimulating and building up the industries of our country. To attain this, I think the tariff must be revised so as to be fair to all interests, so as to encourage a trade with foreign nations, so as to bear heaviest upon articles of luxury and lightest upon articles of necessity, and so as to cover any increased cost of production which may be caused by the payment of higher wages to American workmen.

JOSEPH WHEELER,
(*Dem., 8th Alabama.*) Wheeler.

For Lower Duties on Some Articles and Higher on Others.

I have always been in favor of a protective tariff. Future modifications should be made in reference to the necessities of our various industries and of the Government. It would, doubtless, be for the interest of the people that some of the articles now included in the tariff schedule should have less duty imposed on them, while others should bear a higher duty. I think that in making up the different tariff schedules, each industry should be separately considered, and its particular necessities carefully weighed.

JOHN R. BUCK,
(*Rep., 1st Connecticut.*) Hartford.

Solid for Protection, Especially to Wool.

I am in favor of maintaining upon the statute books of the country a protective tariff. I favor the principle of protection to the labor and industries of this country, to the end that the capital of American manufacturers may have just reward, and to the further end that American labor may be well paid. I do not see at this time how we can very largely reduce the revenues from imports, and hence I answer your second question in the negative. I want to see the staple industries of the whole country protected by a tariff, and I especially feel that gross injustice has been done to the wool interests of the country, and I am not willing the wrong shall stand. Lapse of time does not lessen my feeling upon this question. I would so stimulate the industries of America as that every branch of productive industry should have the fostering care of protection as against the cheaper labor of other lands. This, in my opinion, does not imply the building-up of monopolies, and, on the other hand, it cheapens commodities.

C. H. GROSVENOR,
(*Rep., 14th Ohio.*) Athens.

For Protection Straight, Without Sugar.

In reply to your favor, I beg to say that I am in favor of a protective tariff. There are some inconsistencies and inequalities in the existing schedules which should be removed, but I am opposed to a general reduction of the present tariff. It is evident, however, that some course must be taken to bring the revenues nearer to the expenditures necessary for all economical administration of affairs. The surplus revenue furnishes a strong argument to the free traders, and it is claimed by some that, in order to weaken them in this direction, something must be thrown overboard to save the rest. I think this was the underlying motive which prompted the suggestion of abolishing internal revenues, but public sentiment seems to be averse to the removal of the whiskey tax. For those actuated by such a motive a seemingly judicious plan would be to abolish the duty on sugar, and remove the more glaring inequalities now existing in our tariff laws. This would reduce the revenues to the desired point, while the loss of revenue to the Government would be returned substantially to the consumer in lower prices. Excessive revenues in the present condition of our finances and national indebtedness must lead to extravagant expenditures, or invite attack upon *all* of our protected interests, similar to the horizontal reduction proposed last winter by Col. Morrison.

JNO. B. WEBER,
(*Rep., 33d New York.*) West Seneca.

While a member of the House in the Forty-fourth to the Forty-seventh Congress, I sustained the protective policy, and I am now more convinced than ever that such policy is for the best interests of the country. On most articles there has been sufficient reduction, except on sugar. I shall favor a large reduction on that, if not a total repeal. Probably the reduction on wool was too great. I am sure, then, that I do favor a protective tariff, and that I do not favor a general and substantial reduction of the present tariff.

L. B. CASWELL,
(*Rep., 1st Wisconsin.*) Fort Atkinson.

In my judgment, American industries and American labor should be encouraged and protected, and such sensible tariff legislation as will tend to secure that result will meet my approval. At the same time, I am of opinion that the existing surplus is somewhat larger than is necessary, and that the present tariff might safely be revised (not horizontally), to the end that necessaries like sugar, and other articles of this class, might be admitted to this country either free of duty or upon the payment of a tax much less than is now exacted. The burden of taxation should largely fall upon luxuries, while articles of necessity should be made to contribute comparatively little toward the support of the Government.

J. H. GALLINGER,
(*Rep., 2d New Hampshire.*) Concord.

For Protection with Sugar In It.

In reply to your letter asking my views on the tariff question, I would briefly state that I represent a sugar and rice-producing district, and that I believe in protection.

MICHAEL HAHN,
(*Rep., 2d Louisiana.*) New Orleans.

In answer to your inquiries, I send the enclosed slip, containing a copy of my letter of acceptance, in which my views are fully defined.

L. ST. MARTIN,
(*Dem., 1st Louisiana.*) New Orleans.

In the letter above-mentioned, Mr. St. Martin favors "the protection of American industries, the maintenance of the wages of labor, and a gradual repeal of the internal revenue tax, as the liquidation of the national debt progresses." He also says: "I believe that the sugar and rice interests of Louisiana are dependent for their preservation upon friendly legislation, and, therefore, such a protective tariff should be adopted as will secure these productions from the dangers of foreign competition."

Views Subject to Modification if Louisiana Industries are Not Protected.

I favor the collection of all revenue required by the Government by a tariff on foreign imports so apportioned as to afford the greatest possible encouragement to every American industry requiring protection for its successful prosecution. I do not favor a reduction of the present tariff until all existing laws imposing internal revenue taxes shall have been first repealed and abolished. After this be done, should the revenue of the Government exceed the requirements to discharge its obligations, and to meet with liberal discretion the just calls for securing the welfare and position of this gigantic country, then I would advocate a reduction of the existing tariff to be so made as to fall equally upon all protected interests. These general views will be subject to modification with regard to interests, the representatives of which are not willing to accord that protection to the products of Louisiana indispensable to their existence.

EDWARD J. GAY,
(*Dem., 3d Louisiana.*) Plaquemine.

California Representatives for Protection.

I am in favor of a Protective Tariff, and have not seen any reason to favor a general reduction of the existing tariff, although there may be some instances in which a modification may be for the benefit of the country at large.

JAS. A. LOUTTIT,
(*Rep., 2d California.*) Stockton

You ask if I favor a protective tariff and a general reduction of the present tariff. To the first I answer yes; the second is not so easy to answer. I am a protectionist, and this will control what I shall do.

J. MCKENNA,
(*Rep., 3d California.*) Suisun.

In reply to your inquiries concerning my position on the tariff question, I have to say that I am in favor of a protective tariff. I am in favor of protecting home industry, giving encouragement to home labor and building up home enterprises. I am, therefore, not in favor of what might be termed a general or substantial reduction of the present tariff rates.

WM. W. MORROW,
(*Rep., 4th California.*) San Francisco.

In reply to your inquiries, I would say, in answer to the first question: I am strongly in favor of a protective tariff. To the second: I am not in favor of any reductions that shall interfere with the manufacturing interests of this country.

H. H. MARKHAM,
(*Rep., 6th California.*) Pasadena.

William J. Stone of Kentucky and William J. Stone of Missouri Agree on Tariff Views.

I endorse fully the Democratic platform upon which Cleveland was elected. I believe that the tariff should be adjusted so that only so much money as the Government actually needs would be raised. I am opposed to a tariff that goes beyond the needs of the Government, and believe that an adjustment should take place that will relieve, as far as possible, the necessaries of life from its burdens. Am opposed to a protective tariff for the sake of protection.

W. J. STONE,
(*Dem., 1st Kentucky.*) Kuttawa.

1st. I am not in favor of a tariff which protects for the mere sake of protection. The only proper or lawful purpose for which a tariff may be levied is the raising of such revenues as are necessary for public uses. 2d. I favor a reduction of the present tariff. In this regard, however, I mean to be conservative. I am opposed to any radical measures, such as will unsettle business or create any wide-spread injury because of a too sudden change. Let the principle of "a tariff for revenue only" become the rule of action, and then let the end be reached gradually, and in such a way that business will have time to adjust itself accordingly. In other words, apply a little practical common sense, both in making laws and obeying them.

W. J. STONE,
(*Dem., 12th Missouri,*) Nevada.

Has Not Had Time to Give the Question Any Thought or Consideration.

I do not qualify as Congressman until March 4. I have assumed until that date that I have no right to ascertain the duties or privileges of the office. I have, up to the present, not had the time to give the *questions any thought or consideration*, but would say that my whole life has been that of a toiler. In Congress, you may rest assured that my voice and vote will be always found in the interests of the toiling masses of this country. Further than this I have nothing to say.

FRANK LAWLER,
(*Dem., 2d Illinois*) Chicago.

Reduce the Tariff by Conservative Methods.

I am in favor of a reduction of the present tariff by conservative methods, in a spirit of fairness to all interests; and I think the reduction should be so made that taxation will be heaviest on articles of luxury, and as light as possible on articles of necessity. Federal taxation should be for public purposes, and not for private gain, and should be limited to the necessities of the Government honestly and economically administred.

JAMES B. MCCREARY,
(*Dem., 8th Kentucky.*) Richmond.

People of Foreign Nations Anxious to Shower Unlimited Wealth Upon Us.

I cannot answer your questions fully without extending this to too great length, and have therefore mailed you a copy of a pamphlet written by myself last spring, which fully contains my views. If you can find time to peruse this, I presume you will obtain all the information you desire as to my position on the question.

WM. D. BYNUM,
(*Dem., 7th Indiana.*) Indianapolis.

[The pamphlet above mentioned is entitled, "A Revenue *vs.* A Protective Tariff," and Mr. Bynum opposes the latter. It contains 64 closely-printed pages We copy the conclusion, which is as follows:

"We have attempted fairly to present the effects of a *high* tariff upon American labor and American industries, and we candidly submit that a policy more injurious, more destructive of national power and greatness, of individual prosperity and happiness, cannot be found in the history of any civilized government. Nothing but our unbounded natural resources have enabled as to stem the tide and stay the flood of destruction. Is there not wisdom and patriotism enough left among the people to ignore the dictates of party leaders and party lines, and right this great wrong? Shall our great opportunities be stifled and our great advantages be destroyed by this most suicidal policy? Foreign Governments are anxious to become more closely allied to us. The people of all nations look to our great resources and free institutions with hope and affection. They are anxious to shower unlimited wealth upon us, if we will but open our doors and send them our goods and our provisions, and take the best they have in exchange. Shall this be our policy, or shall the wall that hedges us in be built higher? must be determined by the people at the ballot-box."

Tariff for Revenue.

In reply to your note of recent date, I will state that I am in favor of a tariff for revenue, and favor the Morrison rather than the Randall view of the tariff.

J. B. WEAVER,
(*Gr. and Dem., 6th Iowa.*) Des Moines.

Favors the Randall View.

I am in receipt of your letter asking my views upon the following questions: Do you favor a protective tariff? Do you favor a reduction of tariff? Do you favor the Randall or Morrison view of the tariff? It appears to me that I can answer the first and second questions by answering the third. I am more inclined to the Randall view of the tariff. I am in favor of a reduction—such a reduction as will benefit American labor and industries.

ABRAHAM DOWDNEY,
(*Dem. 12th New York.*) New York.

Against Measures that Would Injure Existing Industries.

I believe that there is a necessity for a careful revision of the tariff, but I am not in favor of any measures that would injure or disturb the existing industries of the country.

EGBERT L. VIELE,
(*Dem., 13th New York.*) New York City.

Revenue the Object, Protection the Incident.

I regard it as wisest to defray the expenses of the Government by duty on imported articles In laying the duty, under the Constitution, revenue should be the object, protection the incident not the reverse of this. All duties protect when imposed on articles similar to those manufactured here.

THOMAS CROXTON,
(*Dem., 1st Virginia.*) Tappahannock.

Secure the Manufacturing of Goods in this Country.

Do you favor a Protective tariff? Yes.

Do you favor a general and substantial reduction of the present tariff? No.

I am for protection to home industries—all the protection necessary to secure the manufacturing of the goods in this country. I am not in favor of protecting raw materials where they do not come in conflict with anything produced in this country.

GEORGE WEST,
(*Rep., 20th New York.*) Ballston.

For a Protective Tariff and his Own Country and People First, Last and all the Time.

In reply to your inquiries, would say that having been born poor, and having had to fight the battle of life with my hands for myself, and being a true American, and having more love for the people of the United States and their best interests, *I am in favor of a protective tariff.* As to a general and substantial reduction of the present tariff, I am opposed to it; we have gone too far in that direction now. The work of the Tariff Commission and the amendments thereto by Congress, together with the action on the Morrison bill (rather, attempted action), are largely accountable for the present depression in business.

Unless a tariff is protective, so far as labor and the best interests of our country are concerned, we might as well adopt free trade; for, unless tariff is high enough to give fair profits to manufacturers, after paying fair wages to their laborers, the factory will stop, for the business man will probably shut down as soon if the loss on each article was 25c. as if it was 50c. or $1. There is nothing in a tariff that is not protective.

A tariff for revenue only, a tariff for money only, a tariff simply to get money to run the Government—a man or a party that can't see anything greater, higher or better than that in tariff must be blind, indeed. I am for a protective tariff such as will protect American laborers and American manufacturers; I am for my own country and my own people first, last and all the time. I am a Republican through and through.

ALEXANDER C. WHITE,
(*Rep., 25th Pennsylvania.*) Brookville.

Protection Representatives from Thirteen States.

I favor a protective tariff.

JAS. D. BRADY,
(*Rep., 4th Virginia.*) Petersburg.

I favor a protective tariff. 2d. I do not favor a "general and substantial" reduction of the present tariff.

W. D. OWEN,
(*Rep., 10th Indiana.*) Logansport.

I favor a protective tariff. I am a protectionist.

A. C. THOMPSON,
(*Rep, 12th Ohio.*) Portsmouth.

In answer to your question, I reply that I am in favor of a protective tariff, and that I do not favor a general reduction of the present tariff.

FREDERICK D. ELY,
(*Rep., 9th Massachusetts.*) Boston.

In answer to your inquiries—

1st. Do you favor a protective tariff? I answer, I do.

2d Do you favor a general and substantial reduction of the present tariff? I answer, I do not.

RALPH PLUMB,
(*Rep., 8th Illinois.*) Streator.

1st. Do you favor a protective tariff? Yes.

2d. Do you favor a general and substantial reduction of the present tariff? Substantial, but not general.

E. H. CONGER,
(*Rep., 7th Iowa.*) Des Moines.

Am in favor of a protective tariff. Do not believe in general reduction, but presume tariff might profitably be modified upon some articles.

WILLIAM W. GROUT,
(*Rep., 2d Vermont.*) East St. Johnsbury.

1st. Do you favor a protective tariff? Yes.

2d Do you favor a general and substantial reduction of the present tariff? Such a tariff as will not over-protect. I think it needs some revision.

F. C BUNNELL,
(*Rep, 15th Pennsylvania.*) Tunkhannock.

I am in favor of a protective tariff. I am not in favor of a general and substantial reduction of the present tariff so as to prejudice American industries or labor.

J. LYMAN,
(*Rep., 9th Iowa.*) Council Bluffs.

You ask me to reply to two questions. To your first, Do you favor a protective tariff? I answer, Yes. To your second, Do you favor a general and substantial reduction of the present tariff? I answer, No.

W. H. WADE,
(*Rep., 13th Missouri.*) Springfield.

1st. Do you favor a protective tariff? Yes. 2d. Do you favor a general and substantial reduction of the present tariff? No.

IRA DAVENPORT,
(*Rep, 29th New York.*) Bath.

1st. Do you favor a protective tariff? I do. 2d. Do you favor a general and substantial reduction of the present tariff? I do not. I would say, however, that I am no monopolist.

J. ROMEIS,
(*Rep., 10th Ohio.*) Toledo.

1st. I am in favor of a protective tariff. 2d. I am not sufficiently familiar with the present tariff to know whether I would favor a *general* reduction or not, but believe it needs a careful revision.

J. B. GILFILLAN,
(*Rep., 4th Minnesota.*) Minneapolis.

1st. I am unconditionally in favor of a protective tariff.

2d While I think it probable that there might be some proper modifications and reductions of the present tariff, I cannot say that I favor a "general and substantial reduction" thereof.

CHAS. E. BROWN,
(*Rep., 2d Ohio.*) Cincinnati.

I do favor a protective tariff. I do not favor a *general* reduction of the present tariff.

BINGER HERMANN,
(*Rep., Oregon.*) Roseburg.

In reply to your favor of the 13th inst., I am most heartily in favor of a protective tariff.

CHAS. H. ALLEN,
(*Rep., 8th Massachusetts.*) Lowell.

In answer to your inquiries I have to state: 1st. I am in favor of a protective tariff. 2d I *do not* favor a general and substantial reduction of the present tariff.

S. C. MOFFATT,
(*Rep., 11th Michigan.*) Traverse City.

To your inquiries as to whether I "favor a protective tariff," and whether I "favor a general reduction of the present tariff," I answer, I *am* in favor of a *protective tariff*, and am *opposed* to a *general* reduction of the present tariff. The plank of the Republican platform adopted at the National Convention in Chicago expresses my views upon this subject.

GEO. W. FLEEGER,
(*Rep., 26th Pennsylvania*) Butler.

I am a protectionist, and stand on the platform of the Republican party adopted at Chicago.

JNO. A. HIESTAND,
(*Rep., 9th Pennsylvania.*) Lancaster.

I am earnestly for a tariff that will encourage and protect all branches of American industry.

EDWIN S. OSBORNE,
(*Rep. at Large, Pennsylvania.*) Wilkesbarre.

1st. Do you favor a protective tariff? Answer—Yes.

2d. Do you favor a general and substantial reduction of the present tariff? Answer—No.

But there may be some things I would favor the reduction of present tariff on.

OSCAR L. JACKSON,
(*Rep., 24th Pennsylvania.*) New Castle.

For a Protective Tariff in Part.

1st Do you favor a protective tariff? In part. 2d. Do you favor a general and substantial reduction of the present tariff? I do. 3d. Which do you most favor, the Randall or the Morrison view of the tariff? The Morrison.

I have given you categorical answers which, of course, cannot clearly define my views upon the tariff. The "Chicago Platform" very well reflects my views upon the subject. I am opposed to the present repeal of the "Internal Revenue" tax upon whiskey and tobacco, and favor the collection of a sufficiency of duties, through the Custom Houses, upon imported merchandise, together with the Internal Revenue receipts, to defray Governmental expenses, pay interest on the public debt, pensions, and all accruing liabilities without accumulating a surplus in the treasury. If $190,000,000 of revenue collected through the Custom Houses would serve the above purposes, I would so adjust the tariff as to enlarge the free list, put light duties upon necessaries, and heavier duties upon luxuries, and placing the highest duties upon those manufactured articles and products of the soil that most need protection.

P. T. GLASS,
(*Dem., 9th Tennessee.*) Ripley.

Home Competition Sufficient to Regulate Prices.

In answer to your first question, "Do you favor a protective tariff?" I reply most decidedly that I do. To your second inquiry, "Do you favor a general and substantial reduction of the present tariff?" in answer say: If the revenues from the present tariff are likely to be in excess of the prudent and economical needs of the Government, it should be reduced in a manner and upon such imports as would in no way injuriously affect the industries of the country or disturb the home market, which should always be vouchsafed to our own people. Home competition, as history has shown, will so regulate prices that they will be kept within a reasonable margin of profits. No legislation should ever be inaugurated that will disturb the legitimate business interests of the country, nor any changes accepted unless with a view to improve the condition of the entire people. The theory of our Government is that it should be supported by duties collected on imports, and that the tariff should so vary and discriminate from time to time as to protect our industries, secure the home market, and at the same time ease the people from taxation to the greatest extent possible.

WILLIAM A. PIRCE,
(*Rep., 2d Rhode Island.*) Johnston.

Opposed to Present Legislation on the Tariff.

In reply to your letter of inquiry concerning my views as to the policy of a protective tariff, I state unequivocally that I am in favor of the largest possible protection to American industries and American labor. To your second interrogatory I reply that I am opposed to any legislation on the tariff at present. The agitation of this question by the present Congress has been disastrous to the manufacturing interests of the whole country. The depreciation in values and the enforced idleness of thousands is due to the attempt to open our ports to the admission of foreign-made goods free of duty.

JAS. S. NEGLEY,
(*Rep., 22d Pennsylvania.*) Pittsburgh.

Elected Because of Protection Proclivities.

I was elected upon Republican grounds, and because of my protection proclivities. It seems to me unwise to do much tinkering of the tariff now. The brief answers to be made to your questions are—yes to the first, and *no* to the second.

CHARLES S. BAKER,
(*Rep., 30th New York.*) Rochester.

Present Tariff Should be Corrected in Some Features.

In reply to your inquiries, I say:

1st - I do favor a protective tariff.

2d—While I believe there are some features of the present tariff that should be corrected in the direction of fairness and equality, I am not at this time in favor of a general and substantial reduction of the present tariff.

W. C. COOPER,
(*Rep., 9th Ohio.*) Mt. Vernon.

A Clay Protectionist.

I comply with your request with pleasure. I suppose it would answer both questions by saying I was reared and politically educated by a Clay protectionist and am an original Republican, but will answer more specifically—1st. I favor a protective tariff so adjusted as to afford the greatest encouragement and protection to American industry. 2d. Am opposed to a *substantial* reduction of the present tariff, and opposed to any reduction that will materially reduce the wages of our laboring men.

JAS. T. JOHNSTON,
(*Rep., 8th Indiana.*) Rockville.

For a Revision and Decided Reduction.

I have to say, in reply to your inquiries, that I am for a revision and decided reduction of the present tariff. I am in favor of a tariff that will give us revenue enough to meet the wants of the Government, and believe such a tariff can be arranged as will produce this result, and at the same time afford all proper protection to such interests and industries as are entitled to be so protected. I am against any tariff which makes protection a primary object.

BARNES COMPTON,
(*Dem., 5th Maryland.*) Laurel.

Reduce Duties on Necessities, Elevate on Luxuries.

I am in favor of protecting American capital, labor and manufactures against the world. I think the present schedule of the tariff ought to be so altered as to reduce the duties on necessaries used by the great mass of the people and elevated on luxuries, but not in such a manner as to injuriously affect the great business interests of the country. As to the details, of course we cannot speak in a brief letter.

ZACHARY TAYLOR,
(*Rep., 10th Tennessee.*) Covington.

A Morrisonian from Illinois.

I am opposed to a tariff for the sake of protecting the manufacturer, and favor the Carlisle, or Morrison, rather than the Randall view.

S. Z. LANDES,
(*Dem., 16th Illinois.*) Mt. Carmel.

A Friend of Workingmen for Protection.

Three times I have been nominated by the *people* of Albany, and twice indorsed by the Republican party. My nomination for the legislative branch of the government of the nation was made first by the *people*, and afterwards indorsed by the Republican party. When I say the people, I mean the working classes of society and those in sympathy with them. The nomination was tendered me because I was considered a friend of workingmen, and in favor of advancing their interests.

I recognize the industries of America as acting as the organs of the human system. When one is affected, the others feel the result, and hence I am decidedly in favor of protecting every branch of industry carried on in this country. As we are not a nation of shopkeepers or capitalists, our future greatness and the happiness of our people depend on the fostering care by the Government of labor, the great lever that has achieved the greatness we now enjoy. I am opposed to any scheme that would disarrange the industries of America, or cripple investments in that line. I may add that, in accepting the indorsement of the Republican party for Congress, I was in sympathy with its principles on the question of tariff, else I would have so stated and declined the nomination. Therefore, I must necessarily be in favor of a protective tariff high enough to protect, and opposed to any reduction that would invite an injurious competition with our manufacturers and operatives.

JOHN SWINBURNE,
(*Rep., 19th New York.*) Albany.

Strongly and Unalterably for a Protective Tariff.

Having been in Congress for three terms, I had supposed my views upon the tariff must be known. I have no hesitancy in saying in response to your inquiries, however, that, 1st, I am strongly and unalterably in favor of a protective tariff; 2d, I favor no modification of our present tariff which will cripple our industries or tend to pauperize our labor. I am an American.

J. C. BURROWS,
(*Rep., 4th Michigan.*) Kalamazoo.

Inclines a Little to Both Sides.

I am in favor of a tariff for revenue with protection as the incident, and am therefore opposed to a tariff for protection with revenue as the incident. I have objections to both the Randall and Morrison views of the question, and cannot say that I agree with either.

JOHN E. HUTTON,
(*Dem., 7th Missouri.*) Mexico.

Reduce Surplus Revenue.

I have not the time to answer your questions elaborately, but will say that I favor a reduction of the surplus revenue. I do not believe that the revenues ought to exceed the amount necessary to administer the government, pay interest on the public debt, and the debt itself as it may become due.

W. H. CRAIN,
(*Dem., 7th Texas.*) Cuero.

For Reasonable Protection.

The Ohio, Virginia, and National Democratic platforms state my general notions as to the tariff. I am in favor of a revision; how comprehensive I cannot say until I have opportunities to hear and reflect greater than I have as yet had. I am in favor of reasonable protection, not monopolistic. Believe that internal revenue should be first abolished, and that tariff discussions should follow and not precede that needful reform.

JNO. W. DANIEL,
(*Dem., 6th Virginia.*) Lynchburg.

For Protection and Reduction.

I am in favor of a protective tariff. I shall favor a reduction of the present tariff on such articles as can he reduced without detriment to the manufacturing industries of the country.

GEO. W. E. DORSEY,
(*Rep., 3d Nebraska.*) Fremont.

In Full Accord with Morrison and Carlisle.

Will say in answer to your three questions that I am in full accord with Mr. Morrison and Mr. Carlisle on the subject of the tariff. This I think a full response to all your inquiries.

POLK LAFFOON,
(*Dem., 2d Kentucky.*) Madisonville.

No Secret in Being a Protectionist.

Have received your favor regarding protective tariff. While I am not prepared to commit myself upon questions of legislation in the 49th Congress in detail, I can say, what I have so often said on the stump and in the public press for years, that I am in favor of a protective tariff. I am not in favor of any great reduction of the tariff upon any articles manufactured in the United States, or, particularly, which would have a tendency to lower the wages of American laborers.

G. G. SYMES,
(*Rep., Colorado.*) Denver.

Fair and Reasonable Protection.

1st. In imposing duties upon imports, fair and reasonable protection to American labor and industries should be steadily kept in view and upheld as of primary importance. 2d. While by common consent changes in the present tariff law should be made, I should not, as I understand your inquiry, favor "a general reduction of the tariff."

JOHN LITTLE,
(*Rep., 8th Ohio.*) Xenia.

Let the Revenue from Customs Alone.

I am and always have been in favor of a protective tariff, and was elected on that issue. Second, I am in favor of letting the revenues from customs alone severely, except to correct some such oversight as that regarding the cloak manufacture, which the bill of the Hon. S. S. Cox is intended to do.

JAS. G. LINDSLEY,
(*Rep., 17th New York.*) Rondout.

For Protection, If Made to Protect the Right Parties.

I have ever been interested in promoting the productive interests of the nation. Am in favor of a protective tariff, if made to protect the right parties. Think there should be a reduction of the tariff, but just what measures I may favor (if I should take a seat in Congress) I do not know and have not committed myself, wishing to be left to act according to my best judgment in the performance of my duties. This is all that has been asked of me by my constituents. *No pledges.*

C. C. COMSTOCK,
(*Dem., 5th Michigan.*) Grand Rapids.

Protect Labor Equally and Fully.

1st. I do not favor a protective tariff. 2d. I favor strict economy in the administration of government, and limiting taxation absolutely to the needs of government alone. In levying such a tax or tariff, I favor a schedule or arrangement that will, as far as possible, protect labor equally and fully, whether that labor is found toiling in one department of industry or another, not only by keeping up wages, but also in enabling those wages to purchase cheaply the necessaries of life. 3d. This question is too indefinite—the above answers it.

B. J. HALL,
(*Dem., 1st Iowa.*) Burlington.

For a Tariff More Nearly Ad Valorem.

I favor a tariff moderately protective. I favor a reduction on many articles, but not on all. I don't like either the Randall or Morrison view, but of the two prefer the Morrison. I think our tariff should be revised so as to more nearly approach an *ad valorem* tariff.

W. P. TAULBEE,
(*Dem., 10th Kentucky.*) Salyersville.

Protect Our Laboring Classes.

I believe in a tariff for revenue so framed as to afford incidental protection to home industries. In the levying of duties on imports, we should discriminate in favor of home industries, so that American labor may be tenderly cared for. Our laboring classes should be protected against all foreign pauper labor. Monopolies shouldn't be fostered, nor any particular industry favored at the expense of others.

W. H. SOWDEN,
(*Dem., 10th Pennsylvania.*) Allentown.

Protect American Labor and Industries.

I am for a protective tariff such as will protect American labor and industries.

PETER P. MAHONEY,
(*Dem., 4th New York.*) Brooklyn.

For a Protective Tariff with Vote and Influence.

I am in favor of a protective tariff, and during my term in Congress shall certainly vote and exert what little influence I may have in that direction. While the present tariff law may need revising, I should certainly oppose any general and substantial reduction.

GEO. HIRES,
(*Rep., 1st New Jersey.*) Quinton.

Protect Labor First, and then Capital.

In reply to your first question, "Do you favor a protective tariff?" I answer no, but am in favor of a revenue tariff so adjusted and levied as to protect labor first and then capital, to the extent of the tariff thus levied. 2d. "Do you favor a general and substantial reduction of the present tariff?" This is a question I cannot answer definitely without a more thorough examination of the present tariff rates, and a better understanding of its effect on the business of the country, which I would not desire to disturb without a real necessity and to cure or remove some actual evil in the working of the system. In answer to the question, "Which do you prefer or most favor, the Randall or Morrison view of the tariff?" I will say the question is most too wide and general to be answered in a short note. I would, perhaps, agree with Morrison on one branch of the subject and Randall on some other branch. I do not understand that there is a radical difference between those two distinguished men on questions of principle, but only a difference on questions of policy as to the time and manner of doing things.

JOHN B. HALE,
(*Dem., 2d Missouri.*) Carrollton.

Standing on the Party Platform.

In answer to yours of the 9th instant, in which you ask me whether I favor a protective tariff, also whether I favor a general reduction of the present tariff, I have to say that in relation to the subject of tariff and tariff legislation, I stand squarely upon the Republican national platform of 1884.

O. B. THOMAS,
(*Rep., 7th Wisconsin.*) Prairie du Chien.

I know of no better or shorter way in which I can answer yours of the 13th instant than by saying that I was nominated and elected as a Republican, and am in full accord with the platform of that party as laid down at Chicago.

JOHN G. SAWYER,
(*Rep., 31st New York.*) Albion.

In answer to the questions propounded in your favor of the 15th inst.. I have to say that the platform adopted at Chicago by the National Democratic convention of 1884 expresses my views upon the subject of tariff revision.

GEORGE FORD,
(*Dem., 13th Indiana.*) South Bend.

For my views on the question of tariff, I refer you to the platform adopted by the Democratic party at Chicago.

A. C. DAVIDSON,
(*Dem., 4th Alabama.*) Uniontown.

In reply to your inquiry as to my views upon the tariff question, I have simply to say that I endorse and stand upon the tariff plank of the platform adopted by the Democratic party at the Chicago Convention.

W. H. PERRY,
(*Dem., 4th South Carolina.*) Greenville.

Represents an Important Manufacturing District.

In reply to your first inquiry, I will state that I am in favor of a protective tariff. The district which I am elected to represent is one of the most important manufacturing districts in the country, and its citizens expect their representative to do nothing that would tend to reduce the wages of the mechanic, and to cripple the manufacturing industries. Should it be necessary to correct inequalities of the tariff, it should always be done with this in view, viz: That the industries and the labor of the country should be *fully protected.* In answer to your second inquiry, I will say that I am emphatically opposed to any such measures as were proposed by the "Morrison bill," which, if adopted, must have resulted injuriously to the country.

HERMAN LEHLBACH,
(*Rep., 6th New Jersey.*) Newark.

For Incidental Protection.

Enclosed find a speech I delivered and had published that fully gives my ideas and views touching the tariff.

C. M. ANDERSON,
(*Dem., 4th Ohio.*) Greenville.

Mr. Anderson favors "a tariff for revenue, with incidental protection." The following extract from his speech (a copy of which he enclosed) will explain his views on reduction: "The basis of the import duties should be reduced from that of a war to a peace basis. The law needs a thorough revision, discriminating in some instances in favor of American industries. An intelligent business adjustment with reference to our present time of peace is the thing demanded and much needed, striking out of the law such high protective measures as are intended for protection merely, and leaving, and retaining in it, such incidental protection as will protect American labor, and without imposing lower rates of duty than will be ample to cover the increased cost of production in consequence of the higher rates of wages paid to our laborers."

JOHN S. HENDERSON (*Dem., 7th North Carolina*) writes a private letter that he does not desire published. He favors a tariff for revenue, with incidental protection, and believes that when the tariff is amended it should be done item by item in a spirit of perfect fairness to all interests. He is opposed to the horizontal reduction notion.

Prints his Views Daily.

Inasmuch as any views I may care to express on such subjects as you mention are printed *daily* in the *World*, I do not care to avail myself of your kind offer.

JOSEPH PULITZER,
(*Dem., 9th New York.*) New York.

[Mr. Pulitzer is a protectionist, and advocates a protective tariff in his paper—the New York *World.*]

Anti-Protection Sentiments.

Your interrogatories are respectfully propounded, and entitled to be civilly answered. My answer to each, respectively, is as follows: 1st. I am not in favor of a tariff for protection. 2d. I am in favor of a substantial revision and reduction of the present tariff. 3d. I am opposed to the Randall tariff policy.

EDWARD S. BRAGG,
(*Dem., 2d Wisconsin.*) Fond du Lac.

Replying to your inquiries as to my views on the tariff, I have to say that I am not in favor of a "tariff for protection." I am in favor of a tariff for proper revenue purposes, to be so placed as to give the greatest protection to home industries compatible with an honest regard for the rights of all classes of our people as consumers. Since it is an admitted fact that the present revenues of the Government are considerably in excess of all legitimate demands thereupon, it occurs to me that justice to the people whose money we are thus taking from them without proper warrant would demand that such revenues should be reduced.

JOHN T. HEARD,
(*Dem., 6th Missouri.*) Sedalia.

I do not favor a protective tariff, and am in favor of a reform of the present tariff.

F. G. BARRY,
(*Dem., 4th Mississippi.*) West Point.

Decline to Express Tariff Views.

T. C. CATCHINGS (*Dem., 3d Mississippi*), writes: "I dislike to refuse a request so politely made, but I must ask you to excuse me from replying to the questions you ask."

WM. C. P. BRECKENRIDGE (*Dem., 7th Kentucky*) writes a polite note, declining to send an answer to our interrogatories.

J. H. WARD, of Chicago (*Dem., 3d Illinois*), writes: When the proper time comes I will define my position on the tariff.

Sudden Radical Changes Should not be Made.

To your first question, "Do you favor a protective tariff?" I answer that I differ radically with the Republican idea of "Protection the object, taxation the incident," but believe "taxation should be the object, protection the incident;" that under cover of necessary taxation for Governmental purposes all the protection to which we are entitled can be obtained. Replying to your second question, I favor such a reduction of taxation as will bring us to the revenue line, but sudden radical changes should not be made. What I have said will, perhaps, indicate my views.

T. E. TARSNEY,
(*Dem., 8th Michigan.*) East Saginaw.

Summary.

Replies to our inquiry about general views on the tariff from 91 new Representatives are published above. Five (three of one party and two of the other) rest placidly upon their party platforms, without advancing any views of their own. We would not undertake to interpret party platforms, as political doctors disagree so widely in regard to their meanings. We believe platforms have small influence in shaping legislation.

Of the 65 new Republican Representatives, replies have been received, and are published, from 53, *all* of whom declare for a protective tariff, except two, who only mention adherence to the Chicago platform. It is safe enough, in view of the the unanimity of these replies, to count the whole 65 in favor of protection, and we feel confident that the opponents of protection will not dispute the count.

Of the 73 new Democratic Representatives, replies have been received, and are published, from 38, or a majority of the number. Twelve of them are for protection, or for the Randall view as opposed to the Morrison view of the tariff. The 12 are distributed as follows: Five from New York, one from Pennsylvania, one from Virginia, one from Florida, one from Alabama, two from Louisiana, and one from Iowa. Thus 77 of the new members-elect may be relied upon to favor protection in tariff legislation. To these may safely be added the member hereafter to be elected in the 19th Pennsylvania district to fill the vacancy caused by the death of William A. Duncan (Dem.), also the new member (Dem.) elect in the 27th Pennsylvania, from whom we have not received a reply. The Pennsylvania Representatives from both parties are always for protection.

There were 89 members of the present Congress re-elected who voted to strike out the enacting clause of the Morrison bill. One has died since the election. The names of the 88 are as follows:

Wait, of Connecticut; Adams, Ellwood, Hitt, Henderson, Payson, Rowell, Cannon, Thomas, of Illinois; Browne, Steele, of Indiana; Henderson, Hepburn, Holmes, Struble, of Iowa; Morrill, Funston, Perkins, Ryan, Anderson, Hanback, Peters, of Kansas; Reed, Dingley, Milliken, Boutelle, of Maine; Findlay, McComas, of Maryland; Davis, Long, Ranney, Stone, Rice, Whiting, Rockwell, of Massachusetts; Cutcheon, of Michigan; Weaver, Laird, of Nebraska; Haynes of New Hampshire; Phelps, McAdoo, of New Jersey; James, Muller, Ketcham, Burleigh, Johnson, Parker, Spriggs, Hiscock, Millard, Payne, Arnot, of New York; O'Hara, of North Carolina; LeFevre, Seney, Wilkins, Geddes, Warner, E. B. Taylor, Foran, of Ohio; Bingham, O'Neil, Randall, Kelley, Harmar, Everhart, Evans, Ermentrout, Storm, Brumm, Brown, Campbell, Atkinson, Curtin, Boyle, Bayne, of Pennsylvania; Spooner, of Rhode Island; Smalls, of South Carolina; Pettibone, Houk, of Tennessee; Stewart, of Vermont; Wise, Libbey, of Virginia; Goff, Snyder, of West Virginia; Guenther, Price, Stephenson, of Wisconsin.

The classification is as follows:

New Members for Protection.....	79
Re-elected Members for Protection.	88
Total.....	167

As the whole number of members in the House is 325, a majority of nine for protection is already assured. No doubt the majority is really much larger.

Notes.

"In the sweet by and by" there will be no protective tariff on sugar.

Thirteen of the new members whose letters we publish this week have served in Congress before, from one to four terms each.

The first reply to our tariff inquiries came from James Buchanan, of Trenton, (2d New Jersey), and we present his letter as the first on the list. We heartily agree with Mr. Buchanan in the views he has expressed.

William J. Stone, of Missouri, and William J. Stone, of Kentucky, both Democratic members-elect, agree very well on tariff questions, but it remains to be seen whether they will agree to an equal division of mail matter reaching the Congressional Post-Office next winter addressed, "Hon. William J. Stone, Washington, D. C."

W. D Bynum, of Indianapolis (7th Indiana), declares that the people of foreign nations "are anxious to shower unlimited wealth upon us." Both the friends and enemies of protection can see clouds enough gathering on the other side of the Atlantic, but we did not suppose any such shower was coming up. We always thought foreign governments and people limited their anxiety to becoming wealthy themselves, and that this feeling was the cause of their prolonged efforts to break down the American protective tariff.

Free trade newspapers have been congratulating their friends upon the fact that only nineteen of the forty-one Democrats who voted to squelch the Morrison horizontal reduction scheme have been re-elected. Those papers have been trying to spread the impression that the voting on that measure by the 22 members who will not go into the next Congress is the cause of their being left at home. We advise the editors of those papers, before indulging in any more notes of rejoicing over this change of representatives, to peruse letters which we present in this issue from sixteen protectionists (from both parties), who were elected to succeed that number of Democrats who voted to strike out the enacting clause of the Morrison bill. If any of the other six are opposed to a protective tariff, we have not heard of it. One of them writes us that he has not made up his mind on the subject; two are Republicans, who are believed to be for protection, and the other three are Democrats, from New York, Pennsylvania and Ohio, respectively.

We find the following in the January 16th issue of the *Northern Evening Express*, Newcastle-Upon-Tyne, England:

The AMERICAN MACHINIST, which is published in New York, and is the best engineering paper published in America, in quoting an article which appeared in our columns on November the 19th, and commenting thereon, points out very distinctly the difference between the English and American tariffs, and the distinction is important. The English notion of free trade is not "an abandonment of all custom duties, but a tariff levied for no other purpose than to raise revenue." But the national policy of the Americans "is to exempt from tariff all articles *not* produced in this country, and which cannot be produced here." The Americans have a "free breakfast" under their system.

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NEW YORK, FEBRUARY 21, 1885.

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A Protection Majority in the Next Congress.

The array of letters from new congressmen-elect in reply to our inquiries regarding their general views on the tariff, which we present in this issue, will be read with much interest, as the subject is one that closely concerns every legitimate industry in this country. For twenty-three years it has been the policy of the United States Government to protect and promote home industries by judicious discriminating duties upon importations of foreign goods. That policy has been persistently assailed both from abroad and at home, but the nearest its enemies ever came to a victory was last spring when the House of Representatives by a bare majority of three rejected a plan to make a horizontal reduction of twenty per cent. on the whole schedule of duties. Since then a new House of Representatives has been elected, composed of 138 new members, and 187 members re-elected. Manufacturers and others whose business would be severely injured if not wholly ruined by an abandonment of protective duties naturally feel anxious and somewhat apprehensive over the prospect of adverse tariff legislation next winter, especially in view of the confidence with which anti-protection newspapers have been claiming a gain of members, sharing their tariff views, in the 49th Congress, As all but two of the members re-elected gave public expression to their preferences for or against protection by favoring or opposing Colonel Morrison's horizontal reduction bill, it needed only an authoritative expression of tariff preferences by the new members to determine, beyond doubt, whether a majority of the next House are committed to a protective policy or its opposite. We have made inquiry about the tariff views of each of the 138 new members by mail. Upwards of ninety have replied, for which courtesy they have our sincere thanks, as the information thus obtained enables us and all others who desire to do so, to figure up *a clear majority of protectionists in the House of Representatives of the 49th Congress.* We are aware that such a majority has been estimated by many newspapers from supposed reliable information, also that a majority of the opposite kind has been figured up with as much apparent care to avoid errors, by many other newspapers. Neither estimate has been received by the public as convincing, because unsupported by proofs. The views of new members as given in the AMERICAN MACHINIST this week, were furnished to us *over their own signatures* in the form of letters, and in most instances are explicit enough to define the general position of the writer regarding protection. The majority for sustaining a protective tariff is no doubt larger than is made to appear in the letters published this week, as there is good reason to believe that several of the thirty-five new members belonging to the party that will control the next House, from whom no replies to our inquiries have yet been received, are favorable to protection.

As to the probability of any general reduction of the tariff by the 49th Congress, it must be admitted that scarcely any apprehension should be felt. The wide divergence of views upon tariff revision, expressed by the friends as well as by the opponents of protection, makes it next to impossible to effect an agreement upon general reduction. The same differences serve to check reductions on specific articles enjoying protection, unless such reduction can clearly be made without injury to the protected industry. Sugar, however, may be an exception.

It is contended by some that as long as the Senate has a protection majority, the tariff cannot be seriously impaired. We cannot agree with that view.

The members of the House of Representatives are elected directly by the people every other year, and should a bill making radical reductions in the tariff pass that body, the Senate would perhaps be impelled to pass the bill also, but probably in a modified form.

The manufacturing interests of the country are to be congratulated upon the existence of a majority for protection in the House of Representatives, as well as in the Senate, that will enact laws for the nation for the next two years.

Heating Railroad Cars.

Some curious features of heating railroad cars from steam supplied by the locomotive may be noted on the elevated railroads of New York. There has been great diversity of opinion among practical men regarding the practicability of heating railroad cars with steam taken from the locomotive. No other method of heating is used on the railroads referred to, and the results obtained seem to support the views of both the contending parties. On one train, or even in one car of a train, the parties who say steam heating from the locomotive is all that could be desired, will find a comfortable temperature in strong contrast to the congealing frost outside; while probably in the next car or train the temperature is so low that passengers curse the company's employes for permitting the heaters to freeze up. If the search for variety be continued, the investigator will probably find another car where the temperature suggests that some heating medium is in the neighborhood which has merely succeeded in thawing out the inside of the car. The shivering passengers are asking, in the words of the immortal Artemus, "How is this thus?" Their query is never answered, but we can give the true explanation, which is, that the cars are warmed through the medium of patent heaters.

To an ordinary steam engineer it would appear that the ordinary way to warm cars by steam would be through the use of radiators that would give out the required heat. This plan would be too simple for patentees, and designers of car heaters have got out complex arrangements for the heat to pass through, and several companies that control these complicated patents have succeeded in forcing their heaters upon the elevated railroads. Mostly every patentee thinks the elevated railroad companies are in duty bound, as prominent public corporations, to give his device a trial. In one style of heater that is in use on many cars of the elevated roads, a packing of sand is used around the steam pipes to "accumulate" the heat. The accumulation effected is principally in the boiler of the locomotive, since the non-conducting packing prevents radiation of heat from the pipes, the result being that every cold day the cars have a too-too intimate Greenland icy mountain breath. In some of the cars a better heat-transmitting medium is used around the pipes, and better heating results are obtained, but of course it takes more steam to do the business. Plain steam pipes could easily be arranged in these cars, which the heat could pass through and be absorbed direct by the atmosphere inside the car. Condensation is unavoidable in taking heat out of steam, and every attempt to prevent this condensation results in the heater failing to do its work properly. Many of the designers of patent heaters are trying to warm the cars without taking the heat out of the locomotive boiler, and they succeed in freezing the passengers. If the elevated railroad company would throw all their patent heaters into the scrap heap, and use plain radiators, with proper means of draining off condensed water, the change would greatly promote the comfort of passengers.

Master Mechanics' Association Report.

We have received the report of the proceedings of the seventeenth annual convention of the American Railway Master Mechanics' Association, held at Long Branch in June last. At the time the convention was held we gave our readers notes of the proceedings, and abstracts of most of the papers and committee reports, which indicated clearly the nature of the proceedings. The full text will, however, be found interesting and valuable reading for those who are connected with railroad mechanical matters, or desire to keep themselves acquainted with what is going on in this line. One portion of the report, which strikes us as particularly valuable, is the report of the committee of research on improvements in locomotive boilers. The members having this subject on hand did not confine themselves to what different American builders and master mechanics were doing to improve the efficiency of the boiler. They got descriptions and drawings illustrating the best practice in Europe, and even Australia was made to contribute information on the subject. The correspondence is digested and embraced in the report, many engravings being used to elucidate the text. Those who go through this report carefully will be apt to conclude that our master mechanics and locomotive builders are not any behind any engineering establishments in locomotive boiler designing.

The text and engravings of the report are good, and the arrangement reflects credit upon the secretary, Mr. J. H. Setchel. The whole of the contents are indexed, materially increasing the value of the report as a work of reference.

A Trade Combination Weakening.

One of the most successful trade combinations ever ormed to control production is visibly weakening. The manufacturers of wall paper in this country, owing to peculiar causes incident to the business, have been able, until within a year or two, to swing things pretty much their own way in that business, to the present advantage of their own pockets. Events have rendered it doubtful, however, whether they have not mortgaged their future prosperity in order to accomplish this result. Three new manufacturing establishments on the average have gone into the business each year for the past three years, and as many new concerns are likely to start in it during the present year. Five or six of these establishments are now at work outside the combination, some of them said to be producing good work. The trade already shows signs that production is beginning to exceed the demand, and a new deal all around is looked for. Just what form the new deal will take is not known, but it is considered certain, at least so far as present arrangements are concerned, that the combination must go.

We publish, this week, another article of Frank H. Ball on Balancing the Reciprocating Parts of Steam Engines, supplementing an article by him which appeared in our issue of January 3. Mr. Ball takes strong grounds against the theory put forth by the Defiance Machine Works in a pamphlet published by them—a theory which has been accepted by many as correct. His arguments are strong, and he invites criticism by the Defiance Company, or by others who hold to their view.

Literary Notes.

THE FIREMAN'S GUIDE. A HANDBOOK ON the Care of Boilers, by Teknoloforeningen, T. I. Stockholm. Translated from the Third Edition and revised by Karl P. Dahlstrom, M. E. E. & F. N. Spon, 35 Murray Street, New York. Price 50 cents.

This little book contains a great deal of important matter in little compass. It does not profess to teach a fireman how to fire, but it gives a great many directions about the practice of firing and care of boilers, which every fireman ought to know, although we have good reason to be aware, that the information would be new to a large percentage of men in charge of steam boilers. The six chapters in the book treat of firing and economy of fuel, feed and water line, low water and foaming or priming, steam pressure, cleaning and blowing out, general directions. Under each head plain directions are given, that would be of great service to firemen and boiler owners were they faithfully followed. The treatise is evidently written and revised by engineers who thoroughly understand all about boilers. We can highly commend it to firemen and boiler owners.

Bituminous versus Anthracite Coal.

The use of bituminous coal for steam-making purposes has increased so largely during the last year or two, that the anthracite coal companies have determined to increase their allotment for the year 1885 one million tons, with the special view of competing with bituminous coal for the supplying of large manufacturers. The total allotment of thirty million tons previously agreed upon seems likely to be excessive, and the proposed contest between the anthracite and bituminous coal producers for the trade of steam users can, therefore, hardly fail to result in lower prices, to the manifest advantage of users of coal for steam-making purposes. The Pennsylvania Railroad Co., which recently refused to enter the anthracite combination, is extensively interested in the mining and transportation of bituminous coal, so that the coming war is likely to be of imposing dimensions.

It is proposed to arrange the fire engines belonging to the Fire Department of Brooklyn, N. Y., to burn crude petroleum, instead of coal. The great advantage expected to be gained is that engines on duty can carry a less bulky and more convenient supply of fuel.

Questions and Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(54) **Machinist, St. Louis, Mo., asks:** Is there any difference between the American and British standard yard? *A.*—No.

(55) **H. D., Monongahela City, Pa., asks:** Can a locomotive with both front cylinder heads broken be run to headquarters without disconnecting? *A.*—If the engineer can manage to plug up both front steam ports the feat can be done. It is, however, a very difficult matter.

(56) **H. H. Williams writes:** Suppose a train was running at the rate of forty miles an hour, and the engineer sees an obstruction on the track and applies the air brake. Assuming the brake to be in first-class condition, in what distance could the train be stopped? *A.*—In about 500 feet.

(57) **Reader, New York City, asks:** How do large ocean steamers obtain their supply of water for their boilers? *A.*—They use surface condensers, in which the exhaust steam is condensed, then the boilers are fed with the water from the condenser. See answer to question 41, in the AMERICAN MACHINIST of January 31.

(58) **O. D., Oakland, Cal., writes:** I am intending to build a 9″x12″ engine, to run 200 revolutions per minute. What should be the proportions of ports, valve, etc.? *A.*—You can make steam ports ¾″x8″; exhaust port, 1½″x8″; bridges, ¾″; outside lap of valve, 11-16; inside lap, ⅛″; travel of valve, 2¾″; clearance of piston, ⅛″.

(59) **E. R., Dusseldorf, Germany, writes:** I find in one of the recent numbers of the AMERICAN MACHINIST reference to the Schiele curve for bearings. What is this, and for what is it used and how traced? *A.*—It is a peculiar curve to which journals, such as the steps for upright shafts, and others upon which there is a good deal of endlong thrust, are sometimes turned. You will find directions for tracing this curve in the AMERICAN MACHINIST of January 7, 1882.

(60) **G. A. P., ———, S. C., asks:** Which will give the most power, a single engine 4″x5″, or a double engine 3″x4″, both being well-proportioned? *A.*—We should say there would not be much difference. If both are run at the same piston speed, and the same mean effective pressure, the double engine would give the most indicated power, in the proportion of 9 to 8. 2. What would be the power at 300 revolutions, boiler pressure 50 lbs. *A.*—4″x5″, 2 to 2½ horse-power; 3″x4″, double, about 2 horse-power. 3. What should be the size and weight of fly-wheel for 4″x5″ engine, under conditions named? *A.*—Fly-wheel, 24″ diameter; weight, 125 lbs., will answer very well.

(61) **S. T. U., Riverhead, N. Y., asks:** 1 Must an article that is patented be so marked? *A.*—The article should be marked "patented," with the day and year the patent was granted; or, if from the character of the article it cannot be so marked, the package should be marked. The failure to do this takes away the right to recover damages for infringement. 2. Is there any book on foundry work that would enable a beginner to build and operate a small melting plant? *A.*—You cannot expect to learn a trade from reading books. For an excellent work on the subject, we refer you to "American Foundry Practice," by Thomas D. West.

(62) **G. F., Cleveland, Ohio, asks:** 1. What is the proper feed for a ¾″ twist drill? *A.*—It will depend upon what kind of metal is being drilled. For a general answer, 1-100 inch will be about right. 2. What is the advantage of a long belt over a short one, when running in a vertical position? *A.*—When the pulleys are of unequal diameter the long belt will embrace more of the surface of the small pulley. 3. If I have a 3½″ belt, running over 8″ pulleys, 4 feet centers, will it be equal to a 3″ belt over the same pulleys, 7 feet centers? *A.*—We understand you to refer to a vertical belt, in which case, the pulleys being equal in size, the 3½″ belt will transmit the most power.

(63) **J. R., St. Catherine's, Ont., asks:** 1. How can I tell if the crank pin of a steam engine is true? *A.*—You will find this illustrated and explained in the AMERICAN MACHINIST of January 8, 1881. 2. Suppose in two coupled shafts it is found that the end of one of them has dropped down, so that with the bolts out the couplings are open ½″ at top and ¼″ at bottom. From face of coupling to center of journal is 10 feet. How much should the shaft be raised at the journal, and how can I determine this for any conditions? *A.*—Suppose, in the case you cite, the face of couplings are 15″ diameter, then they are out of true ½″−¼″=⅜″ in 15″, and the shaft requires raising ⅜″ in every 15″ of its length. 120″÷15″=8, and ⅜″×8=3″, that the shaft should be raised.

(64) **Montague ———, asks:** Suppose a 24″x36″ engine, driving a heavy load, steam pressure 100 lbs., and revolutions 100 per minute, breaks the crosshead pin, or any part that will instantly release the piston, with what force will the piston strike the cylinder head, and will the blow be greater if the break occurs just as the crank turns its center? *A.*—It may not strike the cylinder head at all. It may cushion on the steam in the exhaust end of the cylinder. If it strikes, the force of the blow will depend entirely upon the construction of the engine, and cannot be calculated with any degree of certainty. It cannot be at all approximated without knowing all about the construction of the engine. Under ordinary conditions, we should say the blow would be harder if the break occurred after the piston had moved a little way from the end, so the steam and exhaust ports will be well open.

(65) **J. C. N., Newport, Ky., asks:** 1. What should be the area of steam port to area of cylinder in a steam engine? *A.*—This is a matter determined by each individual builder for himself, and to a great extent by the character of the valve motion employed. A rule adopted by some is to make the steam port of such area that, supposing it to be wide open, and the piston traveling at mean speed, the velocity of steam through the port shall not exceed 100 feet per second. Thus, suppose the piston speed to be 600 feet per minute, and the allowable velocity of steam to be 100 feet per second=6,000 feet per minute, the area of steam port would be 600÷6,000=0.1 the area of piston, and so for other speeds. Other builders make their ports smaller than this, and others from 10 to 20 per cent larger. 2. What should be the weight of connecting-rod for a given horse power and number of revolutions? *A.*—The weight of connecting-rod cannot be expressed in such terms. 3. What is the regulating efficiency of a fly-wheel of a given weight and velocity? *A.*—We refer you to an article on this subject by Prof. S. W. Robinson, in the AMERICAN MACHINIST of May 29, 1880; also to one on the same subject, by Wm. Johnson, May 13, 1882. 4. What should be the proportion of grate to heating surface in a horizontal tubular boiler? *A.*—The proportion of heating to grate surface in this type of boiler is usually from 24 to 30 to one.

(66) **G. C. S., Alfred, N. Y., writes:** 1. I am running an 8″x10″ engine at 175 revolutions, with 70 lbs. boiler pressure. It is double ported. That is, there is one exhaust port for each steam port. The steam ports are 11-16″×6″; bridges, ¾″; exhaust port, 1″×6″; distance between exhaust ports, 3⅝″. The length of valve is 9¼″, with two exhaust cavities 2½″, and 1⅞″ from end of valve to cavity. Travel of valve, 2¾″. Are the ports and valve well proportioned? *A.*—If you have given dimensions correctly, the outside lap of valve is ⅝″, and inside lap 9-16″. We should apply an indicator, and, if it was not absolutely essential to still running, should cut out the bigger part of the inside lap. It undoubtedly makes considerable back pressure. Otherwise than this the proportions seem to be very good. 2. Steam pipe is 2″, and exhaust pipe 2½″ diameter. Are pipes and ports large enough for 200 revolutions? *A.*—If pipes are not very long, nor crooked, there should be no trouble at the speed named, or at a higher speed than that. 3. What is the power of the engine, and what would be the power at 200 revolutions? *A.*—About 12 horse-power at 175 revolutions, and 14 at 200 revolutions. 4. I have a small engine, 3½″x4½″, to run 300 revolutions. It has steam ports ⅜″x2½″; bridges ⅜″; exhaust port ½″x2½″. What would be good dimensions for valve? The exhaust port should have been ¾″, instead of ½″. As it is you can make valve with ¼″ outside lap, 1-32″ inside lap, and 1¼″ travel. 5. What will be the horse-power of this engine with 70 lbs. steam? *A.*—About two horse-power.

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Dixon's Plumbago Facing or Blackening. Competition is everywhere driving foundrymen to produce smoother castings. This can be well and cheaply done by the use of Dixon's Plumbago or black lead as a blackening or facing. Jos. Dixon Crucible Company, Jersey City, N. J.

Locomotive Engine Running and Management. By Angus Sinclair. Price $2. An excellent book for men interested in steam engineering, valve setting, designing valve motion, the care of the Westinghouse brake, etc. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Manufactures.

Clark & Adams, Elberton, Ga., have purchased ground for carriage and wagon factory.

Some parties propose to start a foundry and machine shop at Havre de Grace, Md.

David Brawley, Charleston, W. Va., will probably establish a foundry in that town.

Geo. B. Grant, of Boston, writes us: "Business is picking up in this section, and most of the shops are going back to full time again."

The engine being constructed by the Corliss Steam Engine Company for the Lower Pacific Mill, Lawrence, Mass., is 3,500 horse-power.

A new twist drill company, to be owned entirely by Taunton, Mass., capitalists, will, it is said, certainly be organized the coming spring.

A contract for furnishing 3,000,000 bricks for the machine shops of the St. Paul & Northern Pacific road at Minneapolis, Minn., has been awarded.

The Roane Iron Company, of Chattanooga, Tenn., contemplate making extensive changes in their plant with a view of starting up these works.

It is reported that the Birmingham Rolling Mills, Birmingham, Ala., contemplate changing their works into a steel-making establishment.

James Elwood, Coal Valley, W. Va., has commenced coal mining operation, and it is reported as possible that a furnace may be erected there.

A company is being organized in Greenville, S.C., to manufacture gins, plows, cotton presses, etc. Capital not decided, but between $10,000 and $30,000.

The Gibson-Lee Manufacturing Company, Chattanooga, Tenn., will more than double the capacity of their stove foundry. Will erect a moulding room 60x135 feet.

The foundry company, previousiy reported as talked of in Athens, Ga., will probably be started by Hodgsen Bros. and others. W. B. Thomas, Athens, can give particulars.—*Baltimore Manufacturers' Record.*

The Vicksburg (Miss.) Water Works Company has been organized to build water works at once in that city, which will cost about $350,000. James S. Pierson, of Brooklyn, N. Y., is President, and Walter P. Elliott, of New York, Secretary.

Ealy's Blue Book is out for January, 1885, containing a revised and classified list and ratings of over 180,000 names of manufacturers and dealers in the machinery, hardware, and metal trades. The present is the 14th semi-annual volume issued by this now well-established commercial agency.

The Ohio Commissioner of Labor Statistics reports 159 machinery establishments in Ohio in 1884, with a capital of $21,603,342 invested. The raw material for use in these establishments for the year cost $9,221,401. The amount paid for labor was $6, 341,215, while the manufactured products were valued at $25,992,918.

The S. Obermayer Foundry Supply Manufacturing Company, of Cincinnati, has been incorporated with a capital stock of $100,000. This company will be the successor of S. Obermayer & Company, of the Eagle Facing Mills and Plumbago Works, manufacturers of foundry facings, plumbago foundry supplies, etc.—*Miller and Manufacturer.*

Work is being pushed on the new wire mill at Wampum, Lawrence County, Pa., and it is expected that it will be in operation next week. There will be two buildings, one 250x90 feet, and the other 250x45 feet. About 50 men will constitute the force at the start, and the number will be increased as business warrants.

A report has been circulated by the daily papers that the Baldwin Locomotive Works had purchased land at Perkiomen, Pa., and would move there from Philadelphia and build entire new shops. We wrote to the company and received a reply that the report is not true. They say: "This report has been circulated throughout this and neighboring States, but has no foundation."

The Thomasville Fertilizing Company is the name of a new firm—not incorporated—which will soon begin the manufacture of fertilizers at Thomasville, Ga. The building, 90x90, is already completed, and the work will begin in a few days. Very little machinery will be used, as they do not propose to grind rock or bones. They will make what is known as "manipulated guano," consisting of cotton seed meal, phosphates and other material which is ready ground. The members of the firm are A. P. Wright, T. C. Mitchell, E. M. Smith, and James Watt.

The Buckeye Machine Company is a new Cleveland enterprise, started the present week, with Mahlon Miller as President, Jeremiah Miller as Treasurer, and Ludwig Herman, as General Manager and Engineer. The works are on Hamilton street, near Case Avenue. The new company will make a specialty of manufacturing and contracting for all kinds of bridges, roofs, structural work, cranes, derricks and hoisting machinery. Mr. Herman, the General Manager, is a well-known mechanical expert, of 22 years' experience in crane and structural work.—*Cleveland Iron Trade Review.*

The Southwark Foundry and Machine Company, of Philadelphia, announce a very encouraging revival in their business. They have many important orders for both Porter-Allen and Southwark high-speed engines. They have in hand a large Government contract for engines and centrifugal pumps for Mare Island Navy Yard, California. Each of these pumps is capable of delivering 40,000 per minute. There are in the works several Bessemer blowing engines, of the new Southwark type, in process of construction, and the company are under contract to build and erect several water works pumping engines for cities and towns. Altogether, the present conditions are of the most prosperous character, and the prospects exceed anything experienced for several years.

Samuel F. Hodge & Company, machinery builders, Detroit, Mich., write us: "We have had no occasion to reduce the wages of our employes, and have been running on full time the entire year 1884. During the year we have turned out one tug engine, two fore-and-aft compound, and two condensing marine engines, rebuilt one propeller engine, and steeple-compounded another; besides this, we have built one head of Ball's patent stamps for crushing copper ore in the Lake Superior region, and a complete plant of pumping machinery for the Norway mine in the Menominee range, Mich., consisting of two 28x36 horizontal condensing engines; two 16″ plunger pumps; one 30 ft. gear wheel, weighing 40 tons, and two sets of bob work complete, the entire plant weighing 250 tons. We also have the contract to build the new pumping engine for the city water works, which will be completed about January 1, 1886. The outlook for the present is not very encouraging, and collections are hard."

In addition to a full line of sizes of their Corliss engine (which the company frankly say is of the regular Corliss type, and is only called Fishkill-Corliss because made in Fishkill), the Fishkill Landing Machine Company, of Fishkill-on-the-Hudson, N. Y., are building several sizes of vertical condensing engines specially adapted for use in large grain elevators. They recently received an order by telegraph from a party whom they had never seen, ordering a $16000 engine of this kind, duplicating one at work in another elevator. One Chicago firm has three of these engines at work in as many different elevators, the largest being 52-inch cylinder. Building machinery for dressing stone is also an established specialty with the Fishkill Landing Machine Company. They report more inquiries for engines and boilers since the first of the year than for some time previously. Besides the Hudson River, their location gives them easy shipping access to six railroads. They have just issued a handsome book, designated as catalogue A, illustrating their line of engines.

Machinists' Supplies and Iron.

NEW YORK, February 5, 1885.

There is no notable change in the supply trade since our last report was made. The spirit of confidence in improved trade in the near future is growing, and that in itself helps to bring the desired "good times."

Iron—The market for pig has been steady during the week, and sellers report that they have less trouble in maintaining prices than they have had for some time. The volume of business was limited mostly to small lots, but there are indications that users of pig are disposed to provide for future wants. We quote standard brands of No. 1 X Foundry, $18 to $18 50 at tidewater; No. 2 X Foundry, $17 to $17.50; and Grey Forge, at furnace, $14.50 to $15.50.

Scotch Pig—This market continues dull, with little business doing and prices nominal. We quote Shotts $21.50 to $21 75 to arrive; Coltness, $21.50 to $21 75 to arrive; Glengarnock, $19.50 to arrive; Gartsherrie, $21.50; Summerlee, $20.50.

✻WANTED✻

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Experienced and practical draftsman wants permanent position. Ad. "Square," AM. MACHINIST.

Situation wanted by an iron foundry supt. or foreman. Adddress Iron Founder, AM. MACHINIST.

Wanted—Experienced man to run roll grooving and grinding machines. Address T. W., care AM. MACHINIST.

Mech. engineer, of good address and experience, wishes to travel part time for good firm. Address Box 2, AM. MACHINIST.

An experienced engineer desires a position as chief draftsman or superintendent. Address N. S. S., AM MACHINIST.

Experienced mechanical draftsman, with a special knowledge of printing presses, wants to make a change Address Box 863, AM. MACHINIST.

A practical tool maker wants position. Expert on dies and tools for sheet metal goods. Address Box 103, Port Chester, N. Y.

Wanted—Position by mechanical engineer of many years' experience on hoisting and pumping engines, air compressors and mining machinery. Best references. Address Box 1, AM. MACHINIST.

Wanted—A traveler; must be posted in steam engines, and some experience in traveling. Good salary and permanent employment to the right man. No other need apply. Address "Governor," AM. MACHINIST.

Wanted—Position as manager, superintendent or designer, by Mechanical Engineer who has has had a technical education and ten years' practical experience in mechanical work and the above positions. Best references. Ad Box 15, AM. MACHINIST.

Foundryman wanted as foreman or contractor. Annual melt 1,200 to 1,500 tons. Character of work largely agricultural, with some machinery castings. Best of references will be required This application from a large concern not far from Chicago, and I believe it to be a good opportunity to the right party. Written communications only will be received. Address S. E Bliss, 89 Lake St., Chicago, Ill.

A steam engine, Corliss system, 10-inch cylinder, 24-inch stroke, only used for a short time, for sale by Keuffel & Esser, 127 Fulton Street, New York.

For Sale—A nickel-pla[te] Richards indicator, with two springs. In perfec[t] rder and but little used Cheap. Apply to "H. G. M. I. Works, Bath, Me.

Wanted—A partner to take half interest in a patentable improvement. Several of them used in every house. P. O. Box 9, Juniata, Neb.

For Sale—Foundry and Machine Shop in city of 3,500 inhabitants. No competition east or west for 100 miles. On St Louis Air Line R. R. This can be bought at a bargain. Address James B. Gamble, Princeton, Indiana.

Wanted—Iron planer, about 30 or 32 wide, in exchange for new or second-hand engines, 6 to 12-inch cylinders, drill press and other machines. Will make it interesting to party having good tool to make this exchange. Logan Machine Works, Oil City, Pa.

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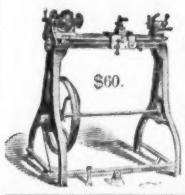

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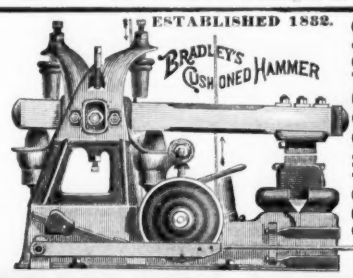

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STRIKES A BLOW WITH
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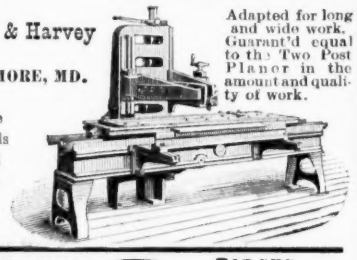

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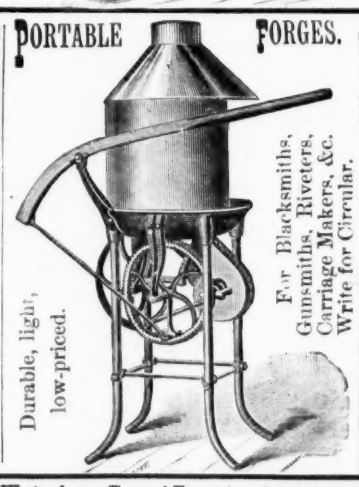

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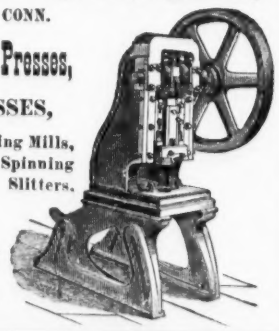

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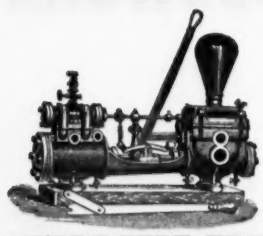

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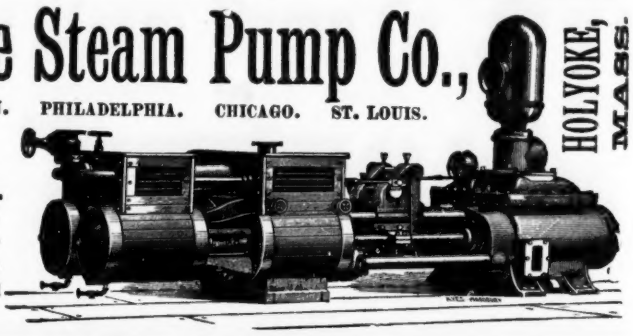

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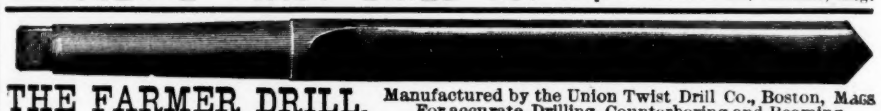

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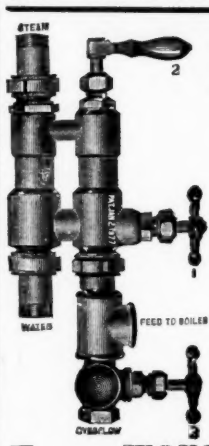

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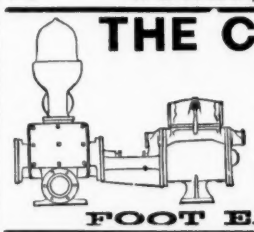

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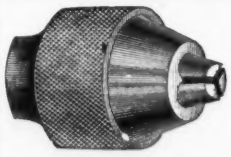

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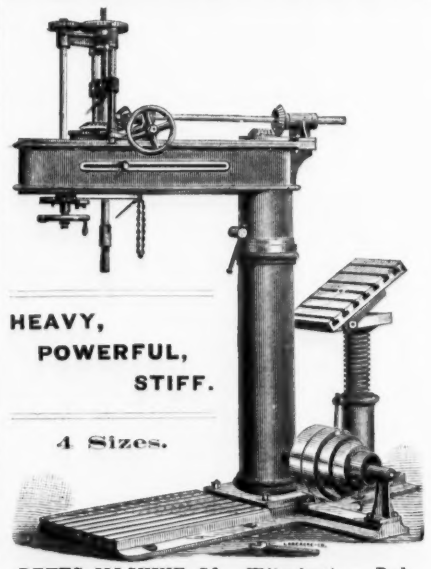

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1	" "	30 in. x 12½ ft.	"
1	" "	28 in. x 9½ ft.	"
2	" "	26 in x 10 ft.	"
2	" "	22 in. x 8 ft.	"
1	" "	21 in x 8 ft.	"
1	" "	20 in. x 11½ ft.	"
2	" "	20 in. x 7½ ft.	"
3	" "	19 in. x 8 ft.	"
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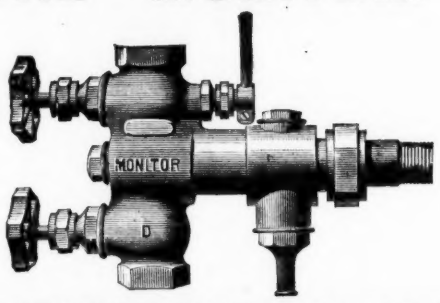

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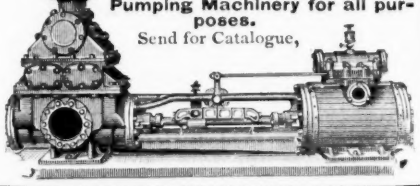

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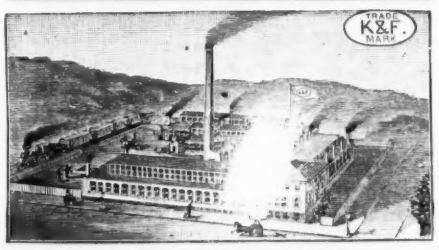

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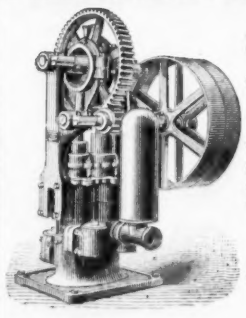

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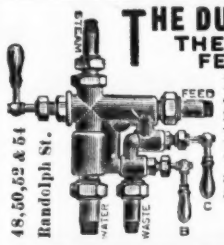

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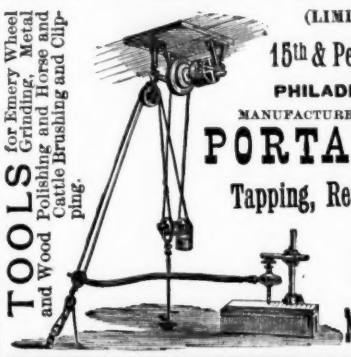

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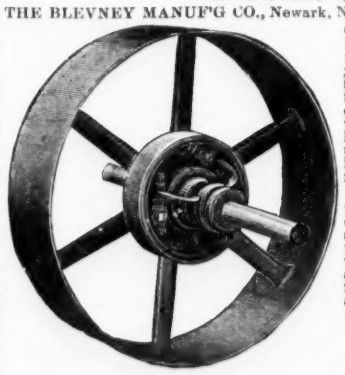

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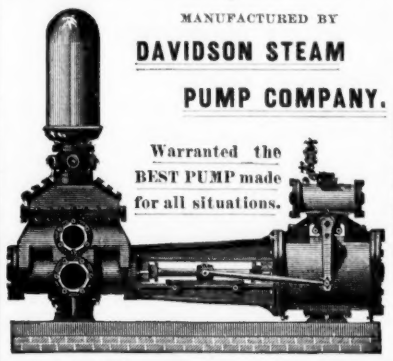

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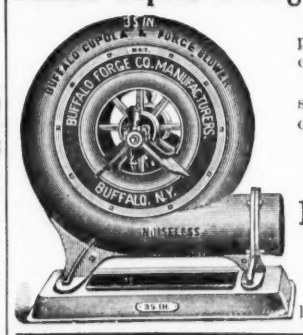

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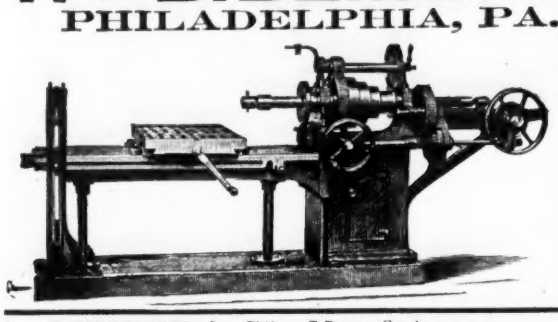

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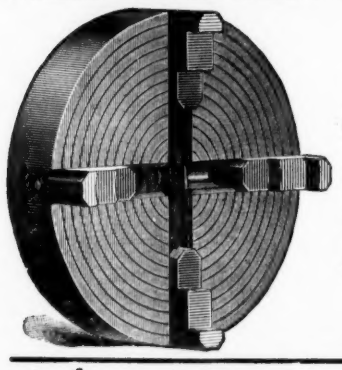

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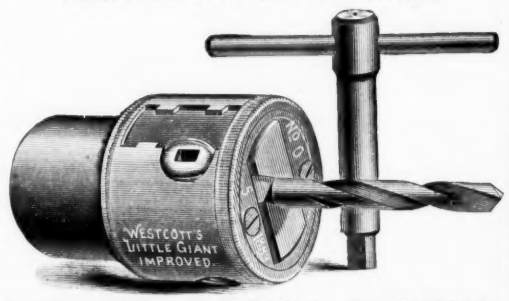

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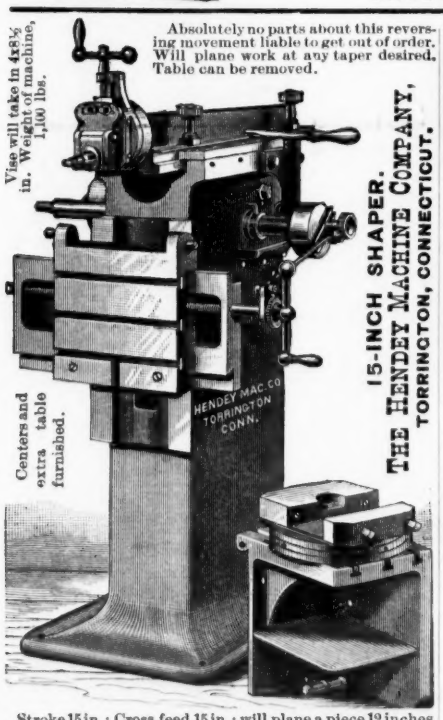

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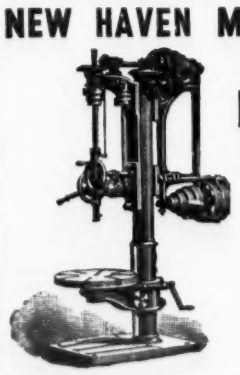

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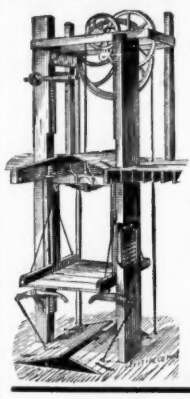

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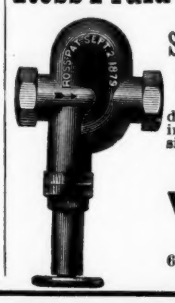

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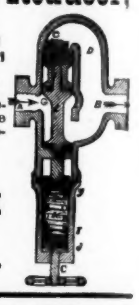

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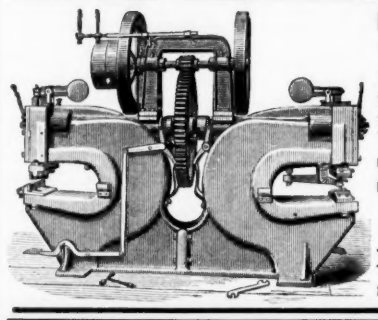

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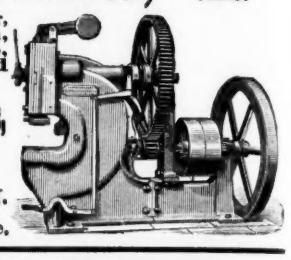

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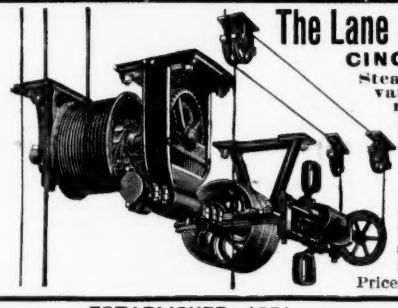

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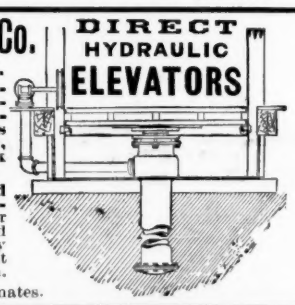

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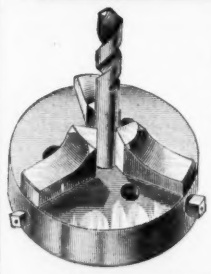

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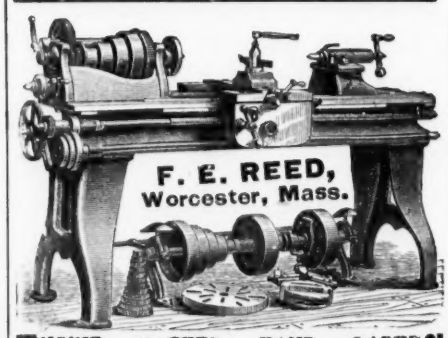

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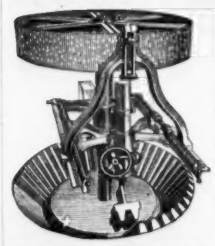

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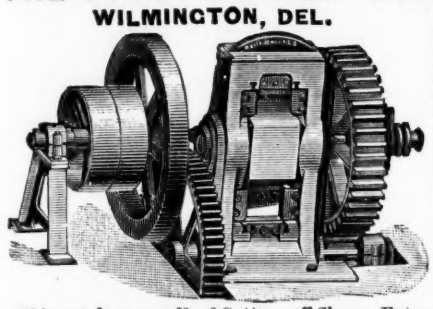

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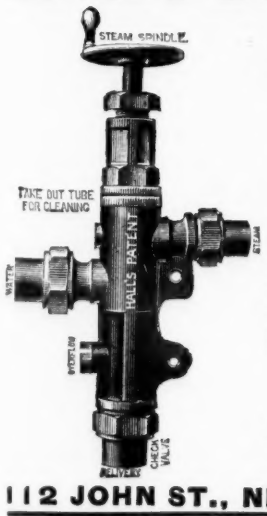

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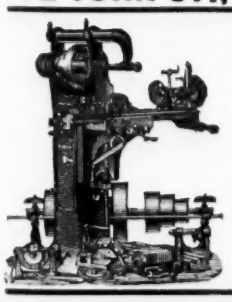

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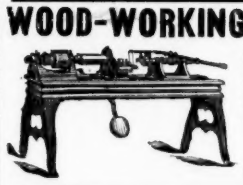

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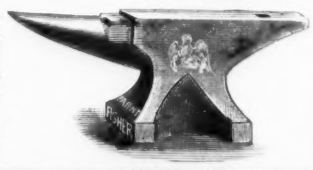

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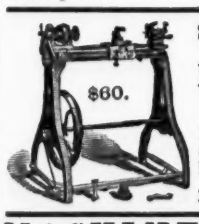

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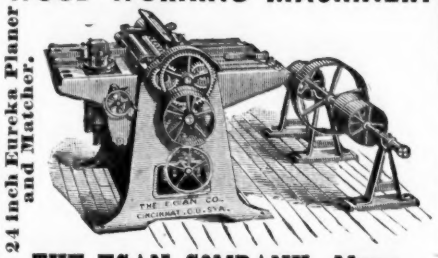

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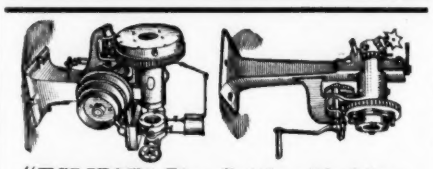

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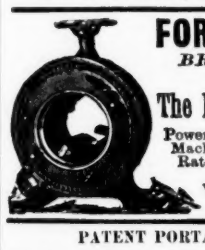

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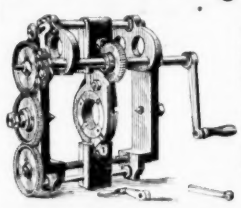

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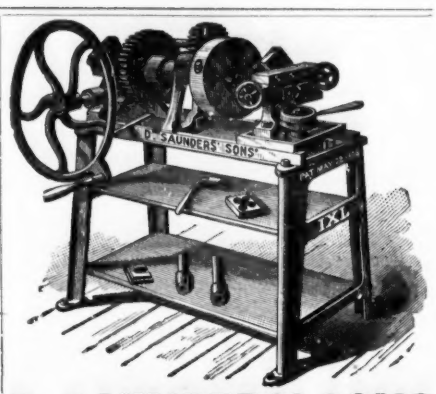

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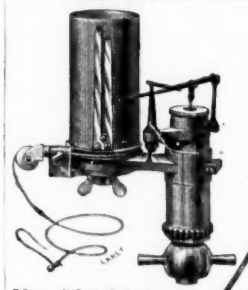

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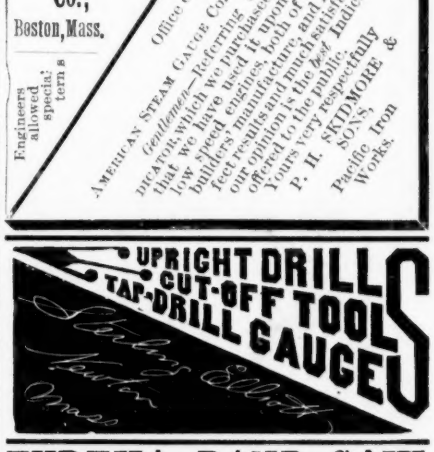

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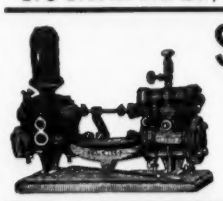

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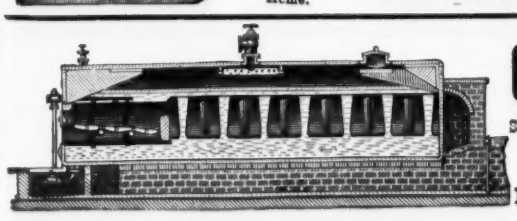

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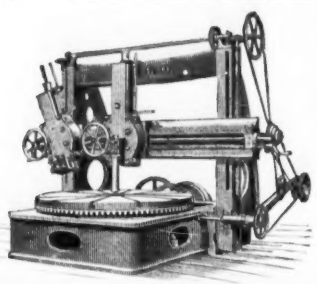

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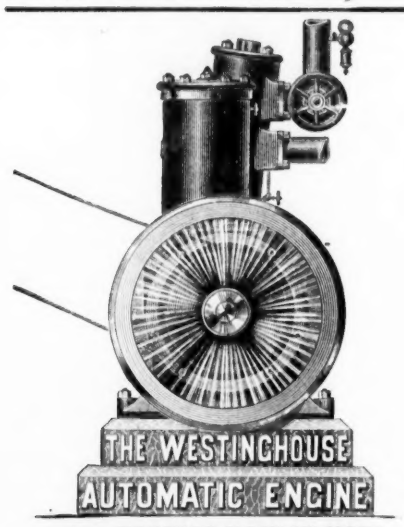

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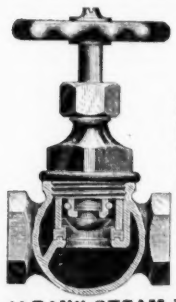

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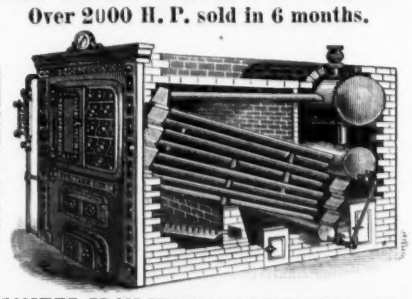

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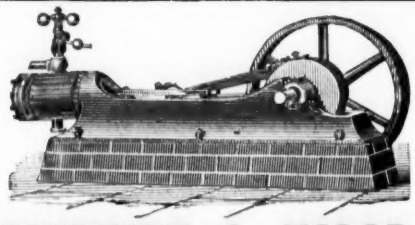

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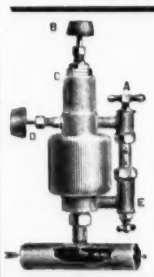

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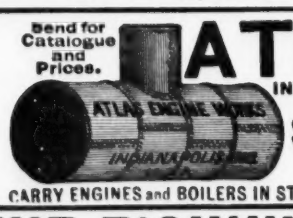

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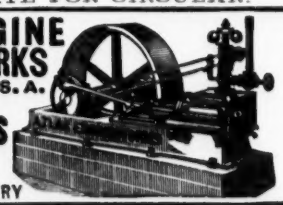

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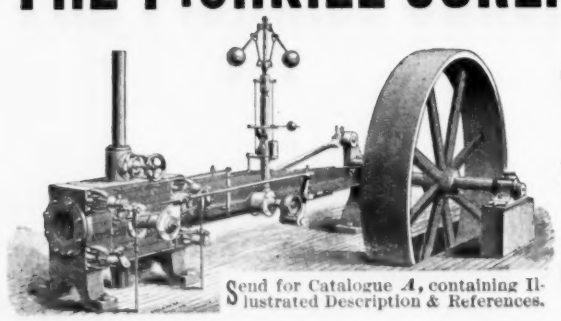

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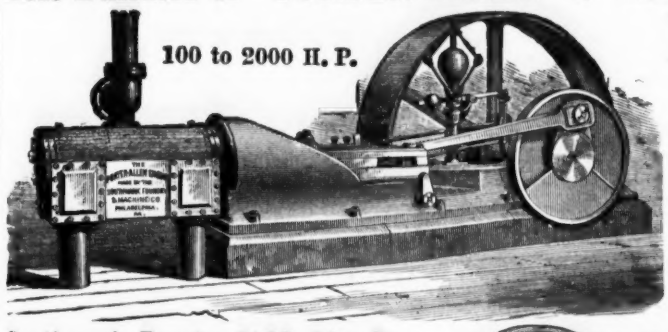

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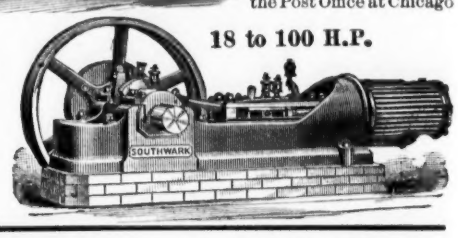

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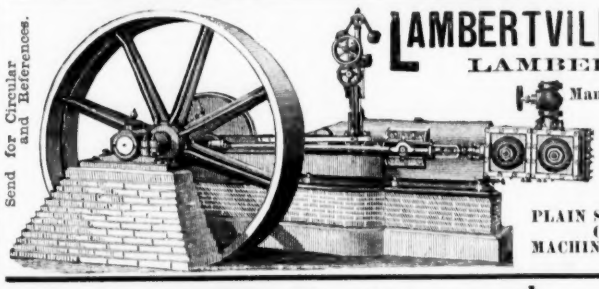

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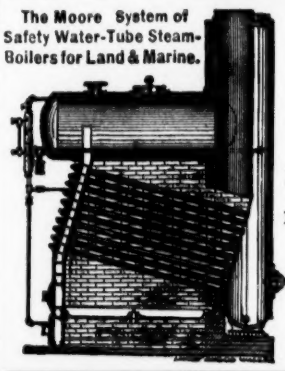
The Moore System of Safety Water-Tube Steam-Boilers for Land & Marine.



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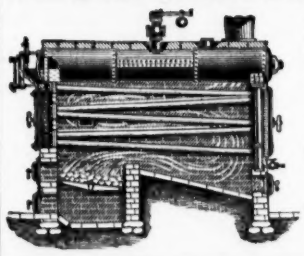

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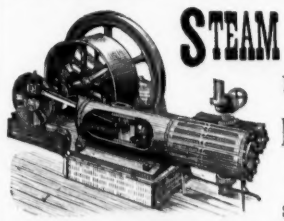

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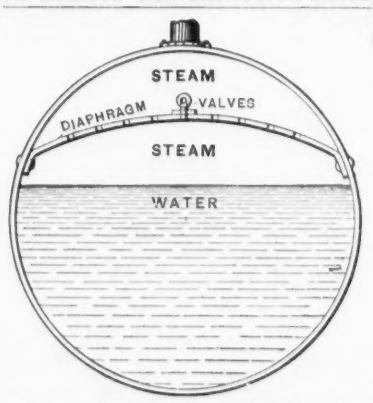

This is the only steam boiler ever devised in strict compliance with the demands of natural laws. It gives complete immunity against explosions, delivers dry steam, prevents all incrustation and deposit on the bottom plates, affords safety with high pressure, and secures great economy. The invention is applicable to every style of boiler, and can be readily applied, internally or externally, to new or old boilers. Licenses granted on liberal terms to manufacturers. Send for description.

Lawson Non-Explosive Boiler Co.,

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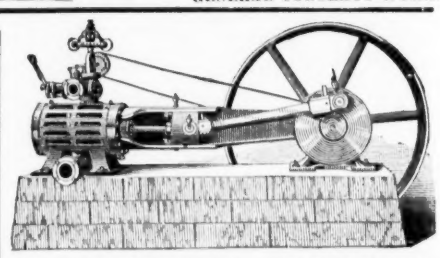

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Boilers of Steel and Iron supplied to the trade or the user Send for Catalogues.

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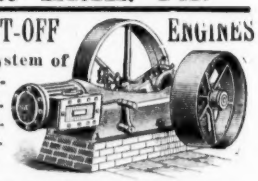

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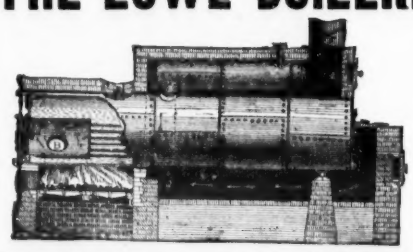

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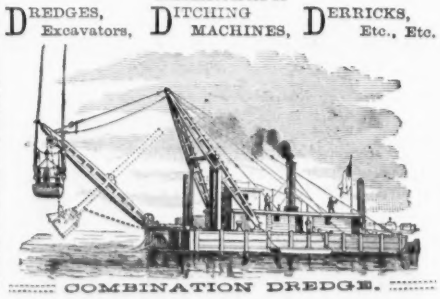

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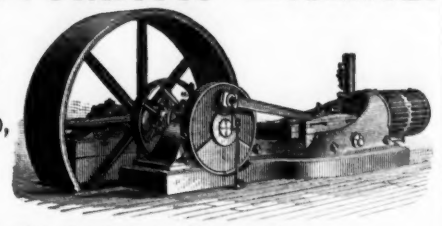

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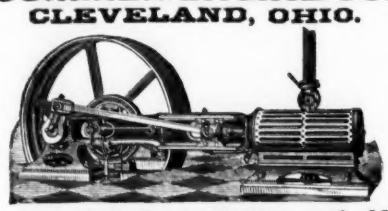

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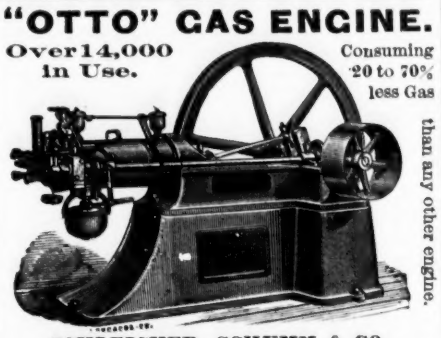

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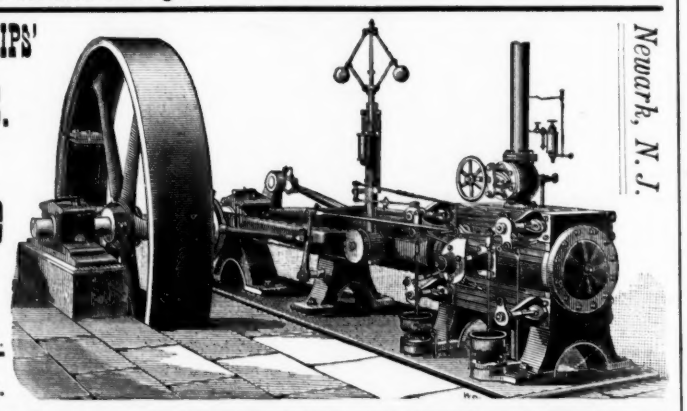

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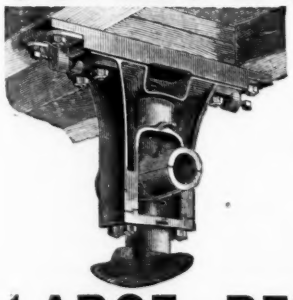

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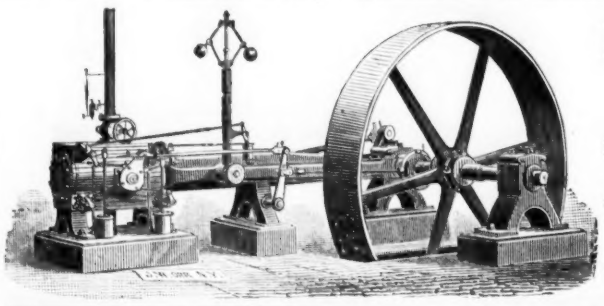

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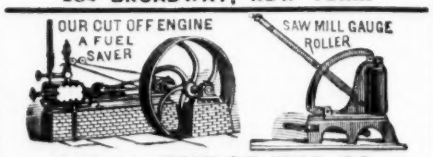

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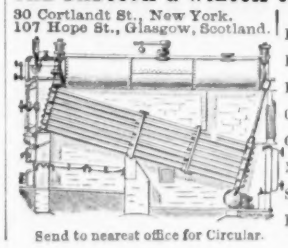

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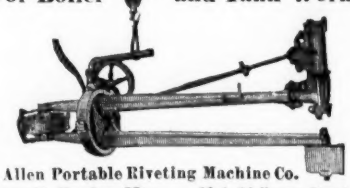

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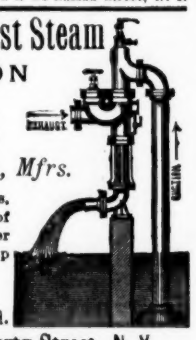

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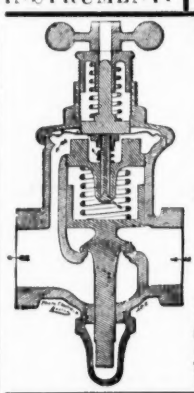

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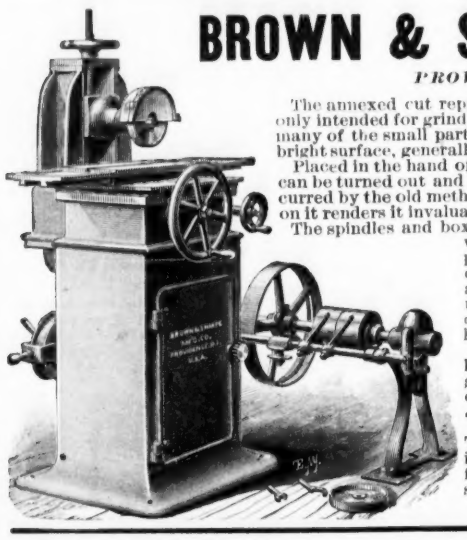

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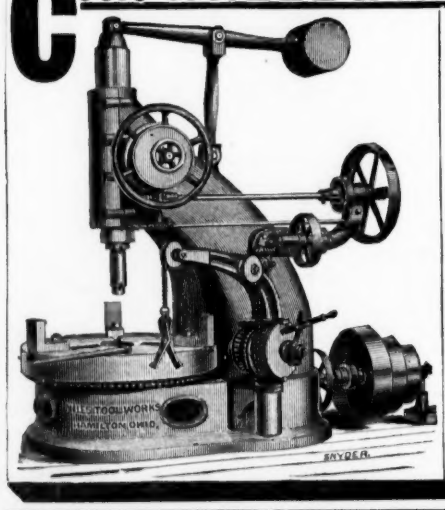

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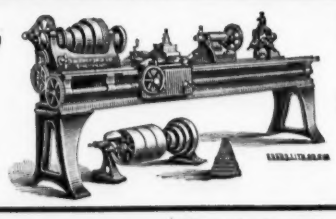

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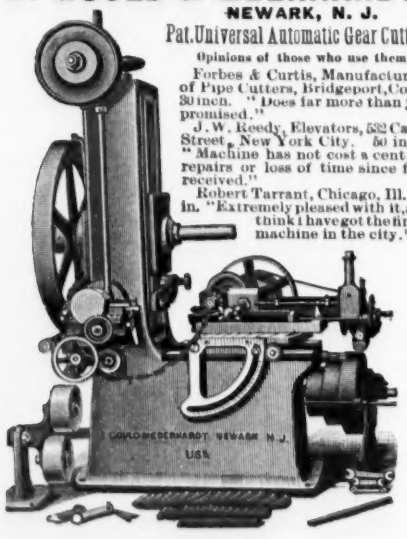

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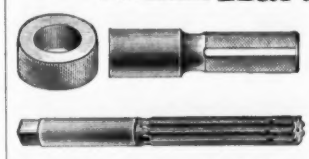

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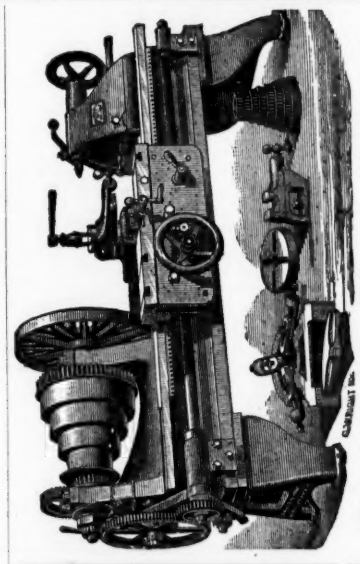

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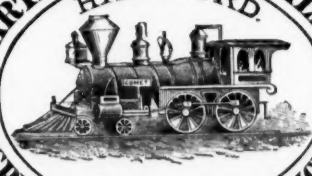

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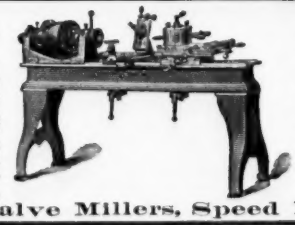

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MANUFACTURER OF **TAPS AND DIES**

Forge, Anvil and Lathe—Jim's and Tom's Work in the "Cheese Box Shop"—Sam Sees With his Fingers—How he Turned the Roll.

BY JAMES F. HOBART.

Every machine shop has some arrangement for blacksmithing, and the first thing a boy does, after he has hoarded his dollars and obtained a lathe, is to buy a little forge. Sometimes the boy buys the forge first, and then aspires to a lathe. If your boys show any inclination in this direction, then just help them along all you can. Don't buy the whole outfit complete. It will not do Jim or Tom one-half the good it will if they have to plan, calculate and study how to get that forge. Show them a chance to earn money enough to buy a small anvil, give them a hint as to how they can build a tuyere out of a piece of boiler iron with five or six $\frac{3}{8}$" holes drilled through it, and some mortar and brick-bats. Give the boys a hint about blowers, and they will have a cheese box doing duty within twenty-four hours.

A boy who "takes" to the blacksmith shop and the lathe is the chap to make a machinist of. He is always taking in ideas, and wants to rattle those ideas into practice before he eats his dinner, and the abnormal knife blades, rickety steam engines and startling water-wheels he turns out in his "shop," and trades to boys in the neighborhood, give a clue to his future genius, and nearly drive his mother crazy.

Give "the boys" the run of the shop. I am not talking now of the shop with seventy-two lathes and seventy-two automatic men to feed them, but of the little "one-horse" concern, with a forge in one end of the shop, a brass furnace in the other, and a pattern shop up-stairs. Tom has no business in the big shop for fifteen years yet, but he goes there then, and Jim is foreman of the foundry, while he is superintendent of the "concern."

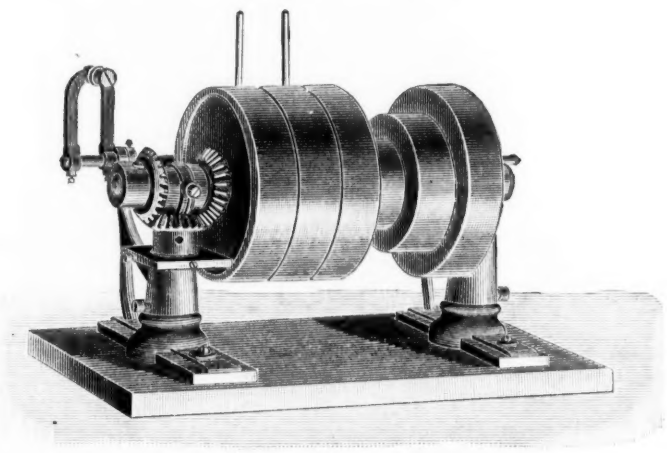
When Tom had a forge of his own, he learned to handle both tools and himself. He found out how much easier he could work when the face of the anvil stood just in line with the point of his elbow, and that it was easier to "strike square" when the anvil was tipped slightly from him.

One day Tom was in the village shop, and watched the smith hunt up a pair of swages—one to put in the hardy hole, the other, its mate, to strike with the sledge. Smith was down under the bench, holding his leather apron with one hand, while with the other he overhauled the bits of iron, patterns, pieces of wood, cobwebs, stray horse-shoes, and old steel traps in his frantic search for "that other swage." Tom thought of the pattern-maker with every tool in a little place made expressly for it; then of Smith, with his nose in the cobwebs, and made up his mind that he would rig a place for *his* swages and hammer. He did it, too. He built a bench, bored it full of holes, and stuck the handles of his tools therein. It worked first-rate. The big seventy-two lathe shop has got a bench which looks like a dove-cot, or the sand-martins' bank of a river. Every swage, die, chisel or drift which is possessed of a handle hangs out at this bench while not in use. It doesn't cause the loss of a heat to find a swage in a hurry.

Tom used to arrange the hand punches, cold chisels and drifts in the same manner. It worked all right in his little "cheese-box shop," but it is "no go" here. He had staples driven into every anvil block, and required the center punch, dead-head, cold chisel, scribe, calipers and dividers to occupy them, together with the punches most in use. "No use, Jim," said Tom one day, "to carry this red-tape tool business too far. The men will stand a little, and like it after they get the hang of it, but too much will get them down on you right off, and *then* you had better emigrate without delay, for just as long as you stay in that shop they will buck against you; your flasks will be piled so bad they are sure to tumble down and break. The ladles will get left with five pounds of dead iron in them; your moulds will blow, and the boys raise Ned generally when you are out of sight. I had rather let the men keep their tools in a nail-keg, as a boiler-maker does, than to have them cussing red tape half the time, so go it easy on this line. If you can make them keep tools in place and think they are making the change themselves, then they will take to it like hot iron to a small boy, and you will get along first-rate."

Tom had a serious row with the anvils in the "seventy-two lathe shop." Some of them had the corners knocked off, some were worn around the hardy hole, one had an inch of the beak broken off, and two had holes worn in the face where the steel was soft. "Best cast-steel" on the face of a wrought-iron anvil is a good thing to talk about, and the anvil-maker keeps it for that purpose. He will weld on shear steel, and not always the best quality of that. It is not half the job to do the welding as if the cast-steel had been used. Tom sent the anvils with broken corners to a concern that ground them, and they came back true on the face, sharp corners, and nearly as good as new. The anvil with the broken beak was placed in the fire, heated and drawn to a point. A sledge hammer was held against the beak to take the force of the blows. When Tom got it down to a point, he gave it a good dose of prussiate of potash, and that anvil, is in use to-day.

One chill cast-iron anvil Tom condemned, and sent it into the machine shop for the boys to straighten small rods on. The best anvil he found to be the old "Peter Wright,"



RUSSON'S REVERSING COUNTERSHAFT.

and its value depended upon the way it was made. The beak, or horn, and tail-piece are forged in one piece, and *not* separately welded to the "core," but are welded to the steel face, and then the whole top of the anvil is welded to the base. Cast-iron anvils with steel faces are very good, but they don't have the "cheery ring" which makes the smith's heart glad, and without which he feels dull, sleepy and "all gone." The steel "reinforced" anvil is a good one; there is no break to it, and it wears well. The anvil with soft spots in its face Tom put in the "glory hole," and bought a new one in its place. He got tired of poor tools when he used to forge revolver springs with a nail hammer on a piece of railroad iron for an anvil in his "cheese-box shop."

When Tom and Jim first got their lathe, they wanted to turn a 2" steel roll 18" long to fix a leather skiving machine for a neighboring harness-maker. What a job they made of it? There were not two inches of that roll which were round and straight. They set the centers true with each other and started the tool across, but it began to squeak before it had cut three-fourths of an inch. A hard spot had gobbled the edge, and the tool was "gone."

The boys tried the job until they got sick of it, and finally got through with it "after a fashion," and the job was as good as many that will be done every day in your shop. One day Tom was in a machine shop just as a man was repairing a belt knife machine for splitting hides. The rolls which guided the skin were 5 feet long, $1\frac{3}{4}$" in diameter, and had to be held up to thin work by two shorter rolls, much like the one they turned for the harness-maker.

Tom sat right down on a horse and watched the man who had just finished turning the long roll "get ready." Sam took his brush and cleaned all the chips and dirt off of his lathe. He took them *all* off, lifted the guard from the cross-feed screw and made sure that was clean, took off the steady rest, and tightened the nut which held the cap down, before he stood it against a post on the floor. Sam then ran his carriage up and oiled the ways, and slid up the tail-stock and fastened it in the right place. Now he looks at his live center. There is no center grinding rig in that shop, so Sam puts a cutting-off tool in the post, sets it to 60°, the angle of the center, and "just skims over it;" then speeds up the spindle, and goes over it very sparingly with a file. The center seems to run pretty true, but Sam is not satisfied yet; he runs the tool up within half an inch of the center, starts the lathe *backward*, and rests his thumb upon the tool in such a manner that he can just touch the center; it is not quite true; Sam can just feel it; the error is small—not more than $\frac{1}{500}$ of an inch. The error a machinist can "see with his fingers" puts the eye to blush every time. He scrapes the center with tool and file until he can detect no error.

Next, the dead center is felt of. That one is all right; it is hard, and stays in place. Sam never lets his centers bottom, or run in a hole with dirt and gravel. He takes an awl and digs the centers out clean, wipes them out with a bit of waste, and is sure they are deep enough. He tries his center-gauge in them to see it they are the right shape. Sam knows well that if that roll doesn't run just about perfect in his lathe, all the machinists in America can't make a good job in turning it.

All this time Tom is sitting on that horse, looking on, for all his eyes and mouth are worth. He sees one place where he missed it. His live center looked some like the big cast-iron center used in the pipe lathe, and there might have been dirt in the centers of that roll.

Sam takes a nice diamond point tool, with medium rake and clearance, and no "side twist." He hardens this tool. He knows just how his steel works, and he makes the point of that tool *hard*, and doesn't draw it a particle, but he grinds it considerably. All the surface is ground off for $\frac{1}{32}$" deep. Sam says the surface of steel that has been exposed to fire doesn't hold an edge very well. When the tool is true and sharp, with nice clean bevels, Sam rounds the point "just a little," and carries the round clear down the clearance of the tool. It is but very little; you can just see it, but Tom finds it makes a big difference in the cutting of the steel.

A nice clean slip comes out of Sam's pocket, and that tool gets an edge a barber would be proud of, and is set "drawing" about 15°. Sam will turn it the other way by-and-bye, when that part of the tool gets a little dull. A dog is put on the roll, and Sam tries the size of both ends with his calipers; he gives it a quarter turn, and tries again; tries in the center, and every inch in length until he finds the smallest spot. He don't want to take off $\frac{1}{1000}$ part of an inch if he can help it; just enough to true the roll. The small place is close to one end. Sam adjusts the tail spindle in a second, but how delicate is that adjustment! He screwed the spindle up, back, then up again; but his fingers told him, as they turned the roll, that the centers did not bind, neither was there any play between them.

The dog is adjusted, and, with a last look at the center marks on the tail stock, the belt is put on the largest step, and the roll starts up at 60 turns per minute; but Sam finds the centers can run faster, and before long changes to the next speed.

"What a light chip he takes," thought Tom, as he hitched to a softer place on the horse; "I guess that cut won't spring the work or tool either." After turning an inch, Sam stopped the lathe and tried the roll with his calipers. He finds it is running a trifle large, and just a *trifle*, too. If he had run clear across, 18", the error would have been $\frac{1}{100}$ of an inch In one inch the error was $\frac{1}{1800}$ of an inch, and yet Sam was able to detect it with those crude-looking calipers! Sam strained up the front off-set screw of the tail-stock a little harder, lowered the tool a trifle by the back screw of the carriage, and began again. With a bit of waste he oiled the roll, and that tool cut clean and left a nice polished surface behind it.

When half way across, the lathe was stopped, the tool run back and the roll changed end for end. Now came the test of Sam's calipers. He turned the tool so it would cut with a fresh edge, started in $\frac{1}{16}$ of an inch, and stopped to try with the calipers; too large; a little turn of the back screw, and try again. Sam can't feel any difference in size with his calipers, and lets it go. Every inch he stops and tries it; no trusting to luck in making good work in his lathe. A hard spot may come along and take off the edge of his tool, and Sam intends to know of such a calamity right off.

When the tool gets to the center, Tom is on his feet watching to see that tool run out either too large or too small; but no. Sam's eye twinkles as the tool runs out, and the calipers can't tell where, and Tom thinks of the roll he turned, which made him think of a caterpillar, then of the nice work he had just seen done, and he goes home with one or two new ideas in his head, which were worth ten times the hour he had spent sitting on that old horse in Sam's shop.

Russon's Single Belt Reversing Countershaft.

In this device the loose pulley is the center one of the three. When forward motion is required the belt is shifted to the pulley to the left, and for backward motion it is shipped to the right hand pulley. This permits the machine to, in part, lose its speed before motion is reversed.

The three miter gears are accurately cut, and run in close gear to avoid backlash and noise; they run in an oil box, concealed from view, and gears and journals are kept thoroughly lubricated.

Some of the points claimed for this counter-shaft are: It requires but one belt, is noiseless in operation, is positive in screw cutting, is durable, dispenses with one pulley on line shaft, and is compact, requiring but little more than half the space usually required.

The inventor is C. H. Russon, Springfield, Ill.

Locomotive engineers and firemen belonging to the railroad divisions ending at Hornellsville, N. Y., are among the best supporters of the Young Men's Christian Association, which has rooms in that city. A movement has recently been instituted in connection with this association, to establish classes for the study of mechanical subjects that the men are interested in. Efforts are being made to secure a model of the locomotive valve motion, so that the young men interested in understanding that subject may have that graphic aid to their studies. This is a most commendable movement and ought to receive the active support of the Erie Railroad officials for the road will be the direct gainer from scientific knowledge required by their engineers.

AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

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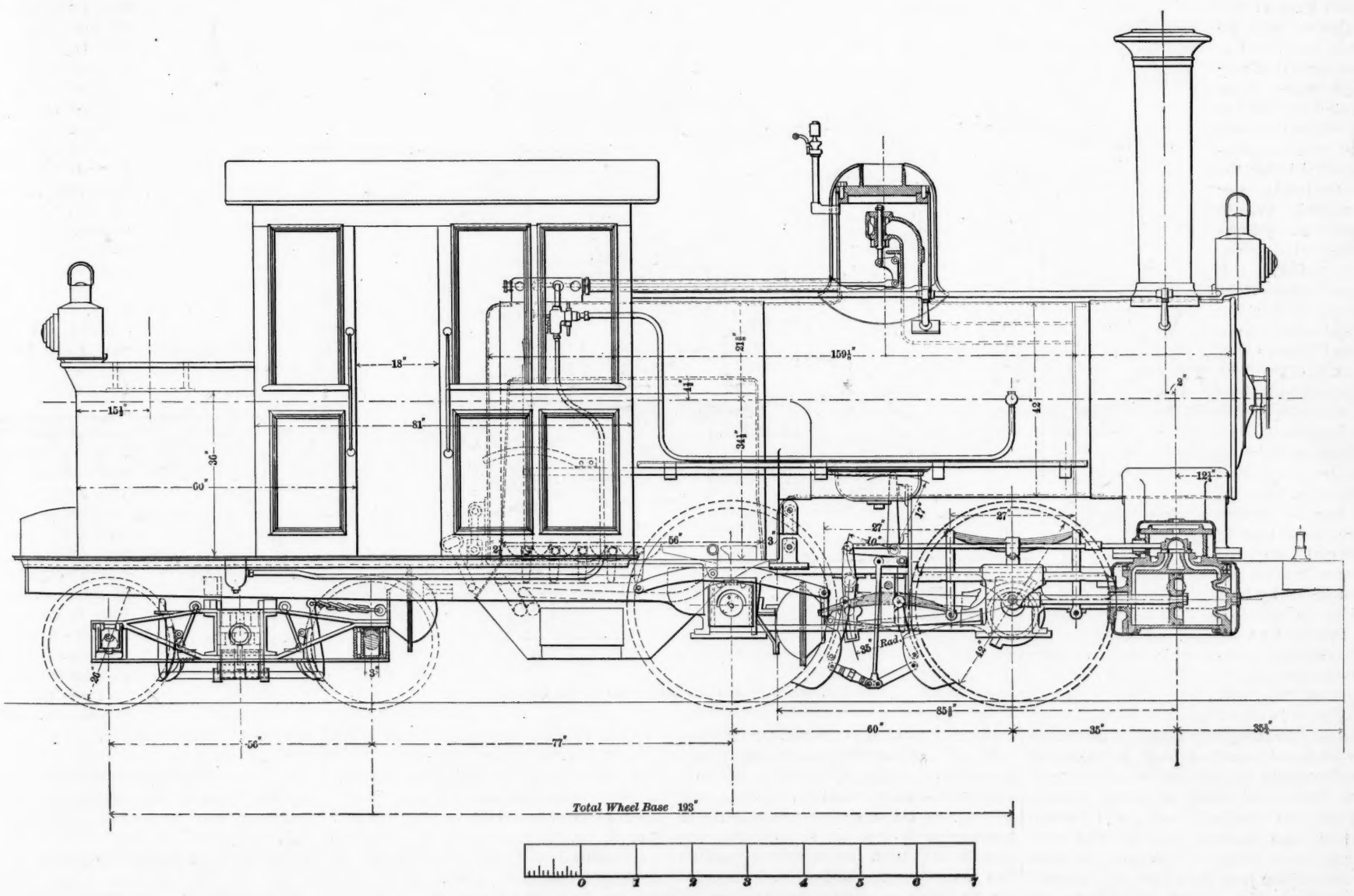
Locomotives for the Brooklyn Elevated Railroad.

On pages one and two, we give sectional views of a locomotive under construction at the Rhode Island Locomotive Works, Providence, Rhode Island, for the new elevated railroad that will be opened in Brooklyn, N. Y., in April. The engine is of the Forney type, and is made from drawings furnished by the mechanical department of the Manhattan Elevated Railroad Co. This is the style of engine that has given most satisfaction among the many types tried on the elevated railroads of New York, and is now the standard locomotive of these roads. Several years' experience with the locomotives as originally built after the Forney patents, suggested to the mechanical management of the roads numerous minor improvements, which were carried into practice on an engine built at the company's shops last year. That engine was put into service, and did so well that the changes were adopted, and embraced in the company's standards of machinery. Fifteen locomotives that were ordered three or four months ago, from the Rogers Works, were specified to be made after the drawings used in building the improved engine, and prints of the same drawings were furnished the Brooklyn Elevated Railroad Company, so our illustrations show the new engines in course of construction for the Elevated Railroad Companies of New York and Brooklyn. We are indebted to the Rhode Island Locomotive Works for the drawings from which the engravings were made.

This style of locomotive is a combination which appears to harmonize conflicting mechanical problems. By the locomotive as ordinarily constructed, part of the weight of the engine is lost, so far as giving adhesion to the driving wheels is concerned, because the engine would ride unsteadily if carried on the short base furnished by the four driving wheels alone. If more driving wheels are added, the length of the rigid wheel base becomes objectionable, so it is usual to put part of the engine weight on a leading truck, whose purpose is to secure steadiness. When he designed the style of engine illustrated, Mr. Forney extended the frame to take in the water tank and coal box, and put a center-bearing truck to carry that part. This gave the locomotive the steadiness resulting from a long wheel base, and gave all the weight of the engine proper to the driving wheels. With the small driving wheels used on the elevated railroads, and on suburban railroads, the engine runs equally well in either direction. An adaptation of the same style of engine has been used as a high-speed locomotive in England, the driving wheels leading. We would be disposed to think that large driving wheels leading would give trouble by cutting the tires, and that they would be dangerously ready to jump the track.

The leading improvements effected by the mechanical department of the Manhattan Railroad Company on this engine are principally on the fire-box and draft appliances. The fire-box, instead of being made narrow and placed between the frames, is widened out and put on top of the frames. In the smoke box a globular vessel is placed, into which the exhaust steam passes, and is emitted through a noise-muffling device by a single nozzle level with the upper tubes.

The engine has cylinders 11x16 inches, and the pistons transmit the power to driving wheels 42 inches diameter. The boiler is 42″ in diameter at the smallest ring, and has 124 tubes 1½ inche diameter and 68 7/8 inches long. Rivets of ¾-inch diameter, not over 2⅛ inches apart, are used throughout the boiler, and all horizontal seams and junction of waist and fire-box are double riveted. The fire-box is 55¼ inches long and 43 inches wide. The crown is arched and is stayed to the shell by radial stay-bolts. Steel is used to great extent in all parts of the engine, and every part is made with a view to securing durability and interchangeability. Experience had taught the Manhattan people that to avoid trouble with driving-box brasses, the best plan was to use a solid box of phosphor bronze, and they always use that material. We see the Brooklyn Company have specified their axle boxes to be made of iron. This is likely to prove a troublesome mistake, for brasses are very hard to keep firm in these small boxes. The Brooklyn Elevated Railroad Company are going to have a good locomotive to start out operating their road with.



LOCOMOTIVE FOR THE BROOKLYN ELEVATED RAILROAD.

Pneumatic Alarm Signals on Pennsylvania Railroad Trains.

The Pennsylvania Railroad Company which have had the Westinghouse pneumatic train signal on some of their trains for some time have finally decided to adopt the system of signaling for all their passenger equipment. The change abolishes the ancient and homely bell rope. By the pneumatic system compressed air is used to transmit signals from any part of the train to the engineer. A pipe connected with the air drum on the locomotive runs through the train and has valve attachments on each car.

Opening this valve reduces the pressure in the air pipe, and that acts on a small triple valve in the cab of the locomotive, which admits air to sound a small whistle. The signals can be given very readily, and should the train break in two or anything happen to fracture the air pipe, the alarm whistle sounds a lengthened blast.

Early Engineering Reminiscences.

ELEVENTH PAPER.

By George Escol Sellers.

In my first paper, I referred to the few available competent civil engineers in the country, and the necessity of borrowing from the topographical department of the U. S. Army to initiate some of the most important of internal improvements.

Immediately following the opening of the New York canal, many of the States were seized with the fever for internal improvements, so much so that competent engineers were at a premium. It was then, if I recollect right, that Major W. H. Wilson took the lead as path-finder for the great system of canals to connect the waters of the Delaware with the Ohio river, and at the same time surveys were being made for what was called the Delaware and the Monongahela divisions of the Pennsylvania system, which were to open to market certain coal districts. For political reasons all these works were undertaken about the same time; for every portion of the State must be benefited to secure legislation and appropriations. Pennsylvania was not alone in making this great mistake, it was the natural outcome of making internal improvements by the States instead of by individual capital.

The work on the Pennsylvania improvements commenced in 1826. The project of crossing the Allegheny range of mountains by series of locks had been abandoned as impracticable for want of water to supply the levels and locks. A portage railway system was adopted, consisting of inclined planes with stationary power and connecting short levels. In the fall of the same year the canal from Columbia on the Susquehanna to the Delaware at Philadelphia, was also found to be impracticable from the same reason which caused the abandonment of the Mountain Division canal—lack of water at proper levels—and in the following year, 1827, the legislature authorized the construction of a railroad between Columbia and Philadelphia, long known as the Columbia or State Railroad—now part of the trunk line of the Pennsylvania Central. This action deciding on railroads, was over a year in advance of the first experiment with any locomotive on the Liverpool and Manchester, and three years before its formal opening; and confirms the opinion that I have already advanced, that the progressive Americans had more confidence in the success of railways than had the great majority of the English at that time.

At the same time that the Pennsylvania works were progressing, Major T. H. Long, afterwards Colonel in the U. S. Army, and who, in his old age, succeeded Col. A. I. Abert as head of the topographical department, was making the surveys and location of the Baltimore & Ohio Railroad, which work he continued until some time in 1830; I believe that during the last year Major C. W. Whistler was associated with him, and he continued the work for a year or more after Col. Long left it. Col. Long was a New Englander, born in Hopkinton, New Hampshire, in 1784. He lived to the age of 80, dying in Alton, Ill., in 1864. His whole life was one of great usefulness. In the year 1829, while engaged on the Baltimore & Ohio, he published his "Railroad Manual" that became the text-book in the hands of all young engineers, it being the first work of the kind published in America. It was through him during the last year of his work on the Baltimore & Ohio, that I became acquainted with his assistant, B. H. Latrobe, which acquaintance ripened into a life long friendship. My acquaintance with Colonel Long dates back to the time he was a frequent visitor at my father's house previous to his expedition to the Rocky Mountains. About the time of his leaving the Baltimore & Ohio Railroad he took great interest in the question of locomotive power, and made a design and working drawings for a locomotive. He induced William Norris, then a merchant of Baltimore, to go into the business of locomotive building, and what was so long and favorably known as the Norris Locomotive Works, of Philadelphia, was established in 1832, and the first engine built was from Col. Long's designs, and could not be called an entire success, but the second or third engine was eminently so. It was a six wheel engine, two drivers, and a four wheel truck. The drivers were in front of the fire-box and carried a large portion of the weight of the engine. It climbed the incline plane at Peter's Island, on the old State road with a loaded tender and as many people as could hang on to it.

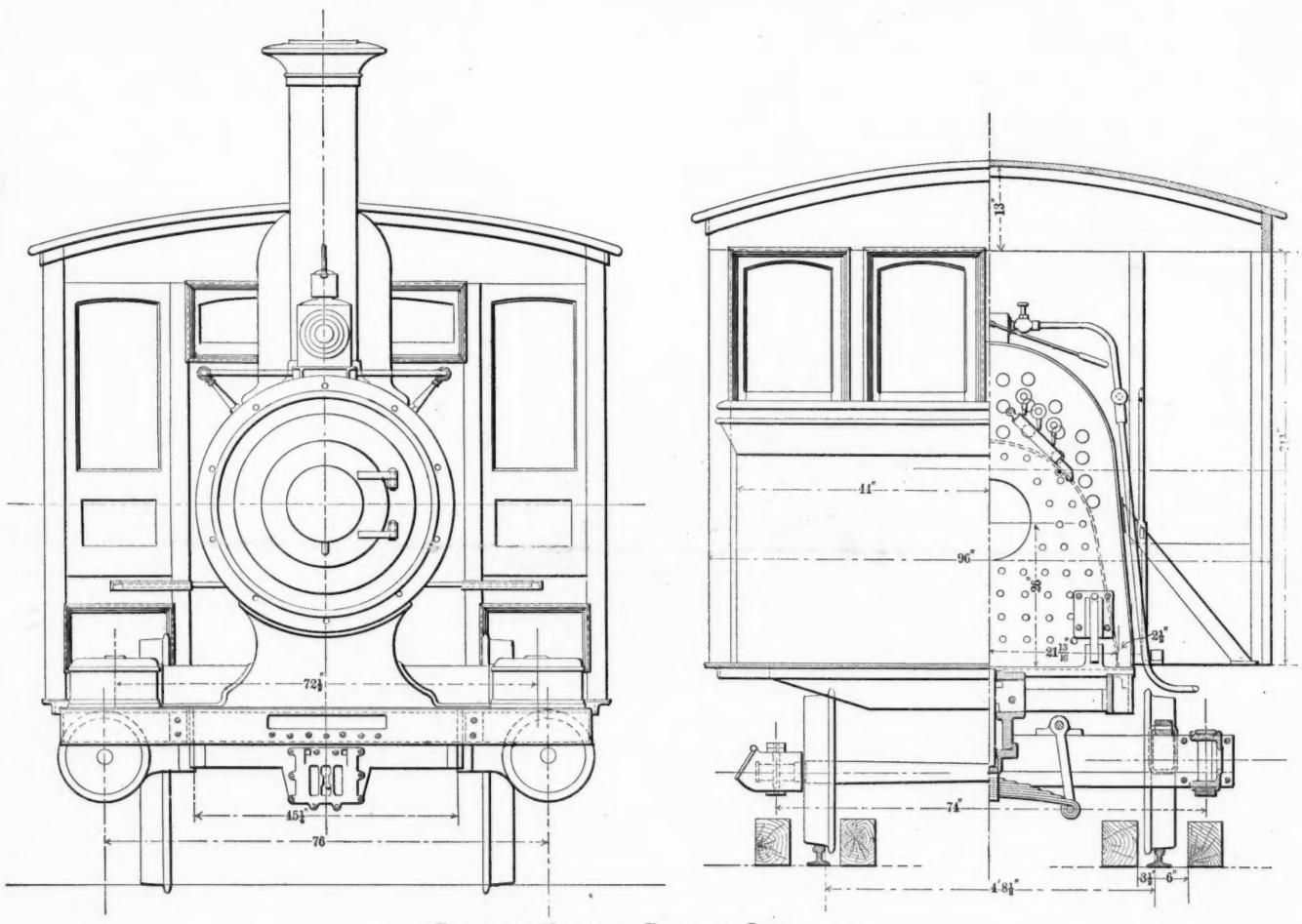
On one occasion, after Mr. Norris' return from Vienna, where he had been building locomotives for the Austrian Government, in speaking of this first engine as the "Long" engine, and the vast strides that had been made in locomotives since it was built, he appealed to me to vouch as one who was present at its first trial for the truth of what he was about to state. The trial was on the Columbia Railroad. I will use his own words as nearly as I can recollect them: "Gentlemen, I can, on my honor, assure you that we ran four miles and a-half in seven hours and a quarter, and running all the time at that." The engine was not so bad as he made it appear. It was deficient in its steaming, and primed badly. The great trouble came from not allowing play on the rails between the flanges of the wheels, between the cast iron chairs which were rigidly secured to stone blocks. The light T rails would spring so as to allow the tire to rest on the rail, but in passing the chairs the flanges would jam, often so much as to raise the face of the wheels from the rail, and the entire four and a-half miles were run by the almost constant use of the pinch bar. After this fault was corrected, and the priming partially prevented by the use of a wove wire diaphragm, the engine did pretty fair service.

From 1837 to 1844 Col. Long was chief engineer of the Western & Atlantic Railroad, of Georgia. It was when on this work that he displayed not only great engineering skill, but mechanical ingenuity in accomplishing a work with the limited means that were available. He crossed great ravines on trestle-work; in some cases series of bents or trestles one above the other, narrowing from the base to the road track, every timber so arranged as to be taken out and replaced in case of decay or any defect without interfering with the traffic on the road. Short spans were successfully crossed on his simple and cheap lattice bridges. After he was recalled from his work in Georgia, he, for many years, had charge of snag removal and improvements of the Mississippi and Ohio rivers. He designed and had built the efficient snag boats, substantially as used at the present time. He was then located at Louisville, Ky., and during that time my intercourse with him was frequent and of a most pleasing character. His leisure was employed on an elaborate series of experiments with models of wooden railroad bridges. It was a wooden inverted suspension arch, in one of these, I have been told, that set Remington off on his wooden suspension bridge, that for a time attracted considerable attention.

It was about the second year of the civil war that business called me to Washington. Learning Col. Long had succeeded Col. Abert, and was then the head of the Topographical Department, I called on him at his office. It had been over two years since we had met, and I was shocked at his evident failure and rapid ageing during that short period. He said he was overwhelmed with work, but it was not that which was wearing him out; he had his duty to perform and was doing it to the best of his ability. He said many years of his life had been spent in the South. He had warm friendship for some of those then engaged in "this fratricidal war," and it was the horror of the thought of that, and not the work that was killing him. He felt he was not fit for the place he was filling, and would gladly retire and relinquish it to some younger man. Night was coming on; it was after the hour for closing his office. I waited for him and together we walked from the department towards Willard's Hotel. He talked of old times, and gave a graphic description of the experiments which led to his efficient snag boats. We dined together, and then went to the house of Prof. A. D. Bache, then at the head of the Coast Survey, where we met Prof. Henry, Commodore Dahlgren and James Saxton, my old schoolmate and friend. It was a most enjoyable evening, and I never saw Col. Long more animated than he was, when Prof. Bache read a letter just received from Commander Farragut on the great value of the work of the Coast Survey, which had enabled him to so place his gun boats under the banks and out of sight and range of the guns of the forts for protection of the harbor of New Orleans; that by calculation they could so handle the guns and mortars as to drop almost every shell within the forts. It was a most interesting sight to see Col. Long and Commodore Dahlgren, with maps, scale and compass locating these gun boats.

This was the last time I enjoyed the company of either Long or Dahlgren. The letters that for years I had been receiving from the Colonel dropped off. This I attributed to the heavy duties during the war, as head of the engineering department of the army. Some time in September 1864, scarce two years after the pleasant evening at Prof. Baches, I saw a notice of the death of Col. Long at Alton, Ill., on the 4th of September of that year. No doubt his life was shortened by the cares and anxieties of the first years of the war. I have always considered him the leading engineer of his time, and I am not alone in that, for B. H. Latrobe referred to him as the father of the engineers of his day.

Major C. W. Whistler was another example of an engineer furnished by the war department. As I have before stated he succeeded Col. Long on the Baltimore & Ohio Roalroad, he also, between the years 1831 and 1842, located and constructed the Paterson & Hudson River, the Boston & Providence and Western Mass. Railroads; resigning his commission in the U. S. Army in 1833. In 1842 he went to Russia in charge of the entire system of railroads. He died in St. Petersburg in 1849. He was a Western countryman, born at Ft. Wayne, Ind., in 1800; graduated at West Point 1819.



Brooklyn Elevated Railroad Locomotive.

Eugene V. Debs, editor of our progressive contemporary, the *Fireman's Magazine*, Terre Haute, Ind., is a member of the Indiana House of Representatives.

Des Moines, Ia., wants manufactories, and those employing 50 or more hands are exempted from taxes for five years. In 1883 its manufacturing amounted to over eighteen million dollars.

Forge, Anvil and Lathe—Jim's and Tom's Work in the "Cheese Box Shop"—Sam Sees With his Fingers—How he Turned the Roll.

BY JAMES F. HOBART.

Every machine shop has some arrangement for blacksmithing, and the first thing a boy does, after he has hoarded his dollars and obtained a lathe, is to buy a little forge. Sometimes the boy buys the forge first, and then aspires to a lathe. If your boys show any inclination in this direction, then just help them along all you can. Don't buy the whole outfit complete. It will not do Jim or Tom one-half the good it will if they have to plan, calculate and study how to get that forge. Show them a chance to earn money enough to buy a small anvil, give them a hint as to how they can build a tuyere out of a piece of boiler iron with five or six $\frac{3}{8}$″ holes drilled through it, and some mortar and brick-bats. Give the boys a hint about blowers, and they will have a cheese box doing duty within twenty-four hours.

A boy who "takes" to the blacksmith shop and the lathe is the chap to make a machinist of. He is always taking in ideas, and wants to rattle those ideas into practice before he eats his dinner, and the abnormal knife blades, rickety steam engines and startling water-wheels he turns out in his "shop," and trades to boys in the neighborhood, give a clue to his future genius, and nearly drive his mother crazy.

Give "the boys" the run of the shop. I am not talking now of the shop with seventy-two lathes and seventy-two automatic men to feed them, but of the little "one-horse" concern, with a forge in one end of the shop, a brass furnace in the other, and a pattern shop up-stairs. Tom has no business in the big shop for fifteen years yet, but he goes there then, and Jim is foreman of the foundry, while he is superintendent of the "concern."

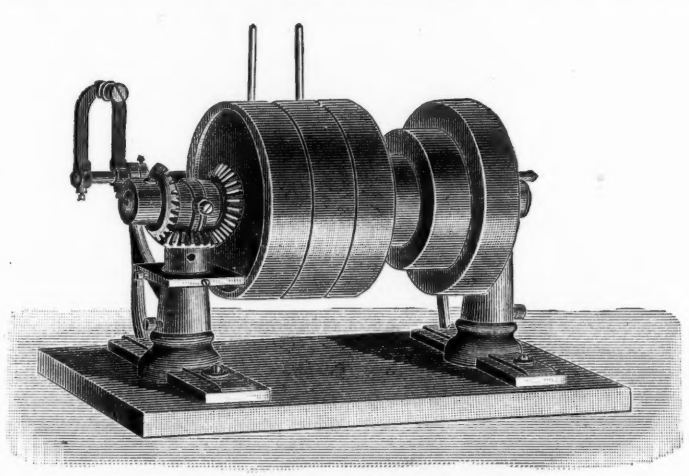
When Tom had a forge of his own, he learned to handle both tools and himself. He found out how much easier he could work when the face of the anvil stood just in line with the point of his elbow, and that it was easier to "strike square" when the anvil was tipped slightly from him.

One day Tom was in the village shop, and watched the smith hunt up a pair of swages—one to put in the hardy hole, the other, its mate, to strike with the sledge. Smith was down under the bench, holding his leather apron with one hand, while with the other he overhauled the bits of iron, patterns, pieces of wood, cobwebs, stray horse-shoes, and old steel traps in his frantic search for "that other swage." Tom thought of the pattern-maker with every tool in a little place made expressly for it; then of Smith, with his nose in the cobwebs, and made up his mind that he would rig a place for *his* swages and hammer. He did it, too. He built a bench, bored it full of holes, and stuck the handles of his tools therein. It worked first-rate. The big seventy-two lathe shop has got a bench which looks like a dove-cot, or the sand-martins' bank of a river. Every swage, die, chisel or drift which is possessed of a handle hangs out at this bench while not in use. It doesn't cause the loss of a heat to find a swage in a hurry.

Tom used to arrange the hand punches, cold chisels and drifts in the same manner. It worked all right in his little "cheese-box shop," but it is "no go" here. He had staples driven into every anvil block, and required the center punch, dead-head, cold chisel, scribe, calipers and dividers to occupy them, together with the punches most in use. "No use, Jim," said Tom one day, "to carry this red-tape tool business too far. The men will stand a little, and like it after they get the hang of it, but too much will get them down on you right off, and *then* you had better emigrate without delay, for just as long as you stay in that shop they will buck against you; your flasks will be piled so bad they are sure to tumble down and break. The ladles will get left with five pounds of dead iron in them; your moulds will blow, and the boys raise Ned generally when you are out of sight. I had rather let the men keep their tools in a nail-keg, as a boiler-maker does, than to have them cussing red tape half the time, so go it easy on this line. If you can make them keep tools in place and think they are making the change themselves, then they will take to it like hot iron to a small boy, and you will get along first-rate."

Tom had a serious row with the anvils in the "seventy-two lathe shop." Some of them had the corners knocked off, some were worn around the hardy hole, one had an inch of the beak broken off, and two had holes worn in the face where the steel was soft. "Best cast-steel" on the face of a wrought-iron anvil is a good thing to talk about, and the anvil-maker keeps it for that purpose. He will weld on shear steel, and not always the best quality of that. It is not half the job to do the welding as if the cast-steel had been used. Tom sent the anvils with broken corners to a concern that ground them, and they came back true on the face, sharp corners, and nearly as good as new. The anvil with the broken beak was placed in the fire, heated and drawn to a point. A sledge hammer was held against the beak to take the force of the blows. When Tom got it down to a point, he gave it a good dose of prussiate of potash, and that anvil, is in use to-day.

One chill cast-iron anvil Tom condemned, and sent it into the machine shop for the boys to straighten small rods on. The best anvil he found to be the old "Peter Wright,"



RUSSON'S REVERSING COUNTERSHAFT.

and its value depended upon the way it was made. The beak, or horn, and tail-piece are forged in one piece, and *not* separately welded to the "core," but are welded to the steel face, and then the whole top of the anvil is welded to the base. Cast-iron anvils with steel faces are very good, but they don't have the "cheery ring" which makes the smith's heart glad, and without which he feels dull, sleepy and "all gone." The steel "reinforced" anvil is a good one; there is no break to it, and it wears well. The anvil with soft spots in its face Tom put in the "glory hole," and bought a new one in its place. He got tired of poor tools when he used to forge revolver springs with a nail hammer on a piece of railroad iron for an anvil in his "cheese-box shop."

When Tom and Jim first got their lathe, they wanted to turn a 2″ steel roll 18″ long to fix a leather skiving machine for a neighboring harness-maker. What a job they made of it? There were not two inches of that roll which were round and straight. They set the centers true with each other and started the tool across, but it began to squeak before it had cut three-fourths of an inch. A hard spot had gobbled the edge, and the tool was "gone."

The boys tried the job until they got sick of it, and finally got through with it "after a fashion," and the job was as good as many that will be done every day in your shop. One day Tom was in a machine shop just as a man was repairing a belt knife machine for splitting hides. The rolls which guided the skin were 5 feet long, $1\frac{3}{4}$″ in diameter, and had to be held up to thin work by two shorter rolls, much like the one they turned for the harness-maker.

Tom sat right down on a horse and watched the man who had just finished turning the long roll "get ready." Sam took his brush and cleaned all the chips and dirt off of his lathe. He took them *all* off, lifted the guard from the cross-feed screw and made sure that was clean, took off the steady rest, and tightened the nut which held the cap down, before he stood it against a post on the floor. Sam then ran his carriage up and oiled the ways, and slid up the tail-stock and fastened it in the right place. Now he looks at his live center. There is no center grinding rig in that shop, so Sam puts a cutting-off tool in the post, sets it to 60°, the angle of the center, and "just skims over it;" then speeds up the spindle, and goes over it very sparingly with a file. The center seems to run pretty true, but Sam is not satisfied yet; he runs the tool up within half an inch of the center, starts the lathe *backward*, and rests his thumb upon the tool in such a manner that he can just touch the center; it is not quite true; Sam can just feel it; the error is small—not more than $\frac{1}{500}$ of an inch. The error a machinist can "see with his fingers" puts the eye to blush every time. He scrapes the center with tool and file until he can detect no error.

Next, the dead center is felt of. That one is all right; it is hard, and stays in place. Sam never lets his centers bottom, or run in a hole with dirt and gravel. He takes an awl and digs the centers out clean, wipes them out with a bit of waste, and is sure they are deep enough. He tries his center-gauge in them to see it they are the right shape. Sam knows well that if that roll doesn't run just about perfect in his lathe, all the machinists in America can't make a good job in turning it.

All this time Tom is sitting on that horse, looking on, for all his eyes and mouth are worth. He sees one place where he missed it. His live center looked some like the big cast-iron center used in the pipe lathe, and there might have been dirt in the centers of that roll.

Sam takes a nice diamond point tool, with medium rake and clearance, and no "side twist." He hardens this tool. He knows just how his steel works, and he makes the point of that tool *hard*, and doesn't draw it a particle, but he grinds it considerably. All the surface is ground off for $\frac{1}{32}$″ deep. Sam says the surface of steel that has been exposed to fire doesn't hold an edge very well. When the tool is true and sharp, with nice clean bevels, Sam rounds the point "just a little," and carries the round clear down the clearance of the tool. It is but very little; you can just see it, but Tom finds it makes a big difference in the cutting of the steel.

A nice clean slip comes out of Sam's pocket, and that tool gets an edge a barber would be proud of, and is set "drawing" about 15°. Sam will turn it the other way by-and-bye, when that part of the tool gets a little dull. A dog is put on the roll, and Sam tries the size of both ends with his calipers; he gives it a quarter turn, and tries again; tries in the center, and every inch in length until he finds the smallest spot. He don't want to take off $\frac{1}{100}$ part of an inch if he can help it; just enough to true the roll. The small place is close to one end. Sam adjusts the tail spindle in a second, but how delicate is that adjustment! He screwed the spindle up, back, then up again; but his fingers told him, as they turned the roll, that the centers did not bind, neither was there any play between them.

The dog is adjusted, and, with a last look at the center marks on the tail stock, the belt is put on the largest step, and the roll starts up at 60 turns per minute; but Sam finds the centers can run faster, and before long changes to the next speed.

"What a light chip he takes," thought Tom, as he hitched to a softer place on the horse; "I guess that cut won't spring the work or tool either." After turning an inch, Sam stopped the lathe and tried the roll with his calipers. He finds it is running a trifle large, and just a *trifle*, too. If he had run clear across, 18″, the error would have been $\frac{1}{100}$ of an inch In one inch the error was $\frac{1}{1800}$ of an inch, and yet Sam was able to detect it with those crude-looking calipers! Sam strained up the front off-set screw of the tail-stock a little harder, lowered the tool a trifle by the back screw of the carriage, and began again. With a bit of waste he oiled the roll, and that tool cut clean and left a nice polished surface behind it.

When half way across, the lathe was stopped, the tool run back and the roll changed end for end. Now came the test of Sam's calipers. He turned the tool so it would cut with a fresh edge, started in $\frac{1}{16}$ of an inch, and stopped to try with the calipers; too large; a little turn of the back screw, and try again. Sam can't feel any difference in size with his calipers, and lets it go. Every inch he stops and tries it; no trusting to luck in making good work in his lathe. A hard spot may come along and take off the edge of his tool, and Sam intends to know of such a calamity right off.

When the tool gets to the center, Tom is on his feet watching to see that tool run out either too large or too small; but no. Sam's eye twinkles as the tool runs out, and the calipers can't tell where, and Tom thinks of the roll he turned, which made him think of a caterpillar, then of the nice work he had just seen done, and he goes home with one or two new ideas in his head, which were worth ten times the hour he had spent sitting on that old horse in Sam's shop.

Russon's Single Belt Reversing Countershaft.

In this device the loose pulley is the center one of the three. When forward motion is required the belt is shifted to the pulley to the left, and for backward motion it is shipped to the right hand pulley. This permits the machine to, in part, lose its speed before motion is reversed.

The three miter gears are accurately cut, and run in close gear to avoid backlash and noise; they run in an oil box, concealed from view, and gears and journals are kept thoroughly lubricated.

Some of the points claimed for this counter-shaft are: It requires but one belt, is noiseless in operation, is positive in screw cutting, is durable, dispenses with one pulley on line shaft, and is compact, requiring but little more than half the space usually required.

The inventor is C. H. Russon, Springfield, Ill.

Locomotive engineers and firemen belonging to the railroad divisions ending at Hornellsville, N. Y., are among the best supporters of the Young Men's Christian Association, which has rooms in that city. A movement has recently been instituted in connection with this association, to establish classes for the study of mechanical subjects that the men are interested in. Efforts are being made to secure a model of the locomotive valve motion, so that the young men interested in understanding that subject may have that graphic aid to their studies. This is a most commendable movement and ought to receive the active support of the Erie Railroad officials for the road will be the direct gainer from scientific knowledge required by their engineers.

Key Seat Cutting Machine.

The engraving represents a machine made for this purpose by the Bailey Manufacturing Company, Owosso, Mich. The work is held to the table by the binder on the upright bolts *D*, *D*. The binder is secured by nuts *E*, *E*. The binder is made so as to swing around out of the way while removing or replacing the work.

The pieces, *F*, are slotted bars, held to the top by set screws. The ends of these bars are placed against the hub or rim of work to keep it from slipping. The crank disk receives motion from the friction pulley *H*, which does away with a fast and loose pulley. By the arrangement employed the pulley is placed in such a position as not to interfere with large work.

Elliptic gearing, not shown in the engraving, gives slow down stroke and quick return.

The cutter, or saw, is pressed up to the work by means of a lever, which is pivoted at the back of the machine.

The detached view shows the manner of fastening the saw. The block *J* has two trunnions, through which set screws, *L*, *L*, pass. One screw is pointed, and screws into a socket on one side of the saw. The other screw has a flat end, and being opposite the pointed screw, holds the saw against the block and the point of the pointed screw.

The block has a wide notch at the point where the screws meet to admit of different thicknesses of saws, and is mounted on bearings on the saw gate, so as to oscillate on the trunnions when the saw swings forward to form the slant or draw of the key seat. The back of the saw bears against the bottom of the notch, so as not to oscillate on the points of the screw.

By the arrangement of gearing communicating motion, a slow movement of the saw when performing work is obtained, at which time the pressure of the lever is applied. On the return stroke, which is rapid, the lever is slackened so as not to injure the saw teeth. By this device the machine can be run much faster than if the motion of the saw were uniform.

Reducing the Face of Spur Gears in the Mould.

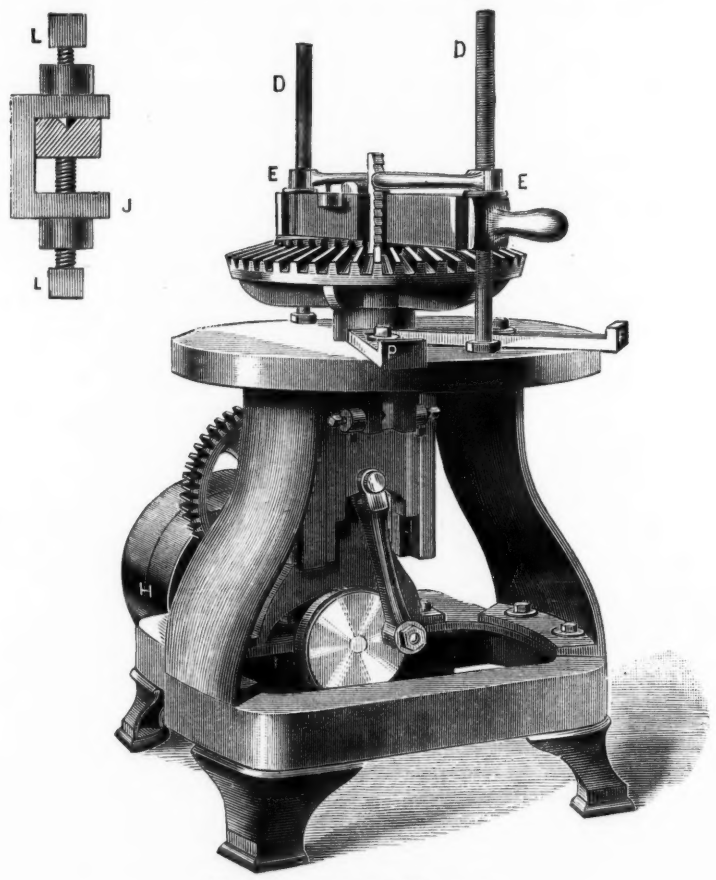
BY JOHN SNOW.

Take for illustration a 4 ft. gear with 12″ face. We want it when cast to be 8″ face; that would be 2″ to be stopped off from top and bottom of the rim. The moulder proceeds to dig out a hole in the floor large enough to take in the pattern with 6″ space for sand all around the outside. He then levels up his pattern and beds it in just the same as if it were to be full width of pattern, letting the top of rim be 2″ above the level of moulding floor. Keep facing sand away from teeth. When the pattern is rammed up in the way stated, make a joint or parting around the arms, after which put the top half of the hub to its place and lay a straight edge across the top of rim to see if the hub is above or below the rim.

The next thing is to make a joint to ram the cope or top part on. Have a ½″ hole put in the center of top hub, then take a straight edge 3″ wide by 1″ thick, and long enough to go from center of hub out as far as where the cope will come. If you find the top hub is below the rim, nail or screw a piece of wood on one edge and at one end, say 10″ or 12″ long, so as to keep the straight edge, when one end rests on the hub on a straight line with the top of rim. Should the hub be above the rim, cut a piece out of straight edge in place of putting the piece of wood on. You then bore a ½″ hole in the center of the piece, and put in a hard wood or iron pin. Let the pin be 2″ long outside of straight edge. Put the pin in the hole of hub, and you have got a sweep. Now nail a piece of wood to the other end, and on the same edge of the straight edge that the pin is on, 2″ wide, and as long as the job requires, bevel one end and the bottom edge of the piece to shape the parting. With this you can make your joint outside of rim.

Next ram up the cope, lift it off and turn it bottom side up, then stick some nails in the hollow space that the rim formed, and fill with sand to make all level. All little bunches should be scraped off the top part outside of rim, to avoid a crush when the mould is put together. Now we have 2″ on top stopped off.

Next comes the bottom. The moulder takes his shovel and takes the sand, say for the space of 3″ or 4″ in width, all away from the outside of his pattern, and puts a mark on pattern to tell how it goes in the mould. Then draw the pattern out of the sand, brush the teeth well, and take a piece of plank 2″ thick and lay it in where the hub came out, and a piece of the same thickness in each of the arms. Take the core print off pattern, and return the pattern, being sure to get it in the same place. When the pattern is returned the blocks of wood will hold it up 2″. Lay some small weights on the pattern to hold it to its place, and it is ready for sand. Use facing sand this time, as the teeth are to remain. Ram under the rim and on the outside a little above where you had first joint, take the 2″ piece off the straight edge and put a 4″ one on in its place; then proceed to make joint as before. When the joint is made, take the trowel, or a suitable tool, and square the top of teeth, vent the teeth, draw pattern out, take out the blocks of wood, and we have got a mould 8″ deep from a 12″ pattern, and it makes a very neat job if a moulder knows his business.



KEY SEAT CUTTING MACHINE.

Steel Shafts Forbidden.

John Roach has received orders from the Naval Department to substitute iron for the steel shafts in all the vessels he has under construction. This order appears to be the result of the investigation as to the reliability of steel shafts that was instituted after the accident to the shaft of the Dolphin during her trial trip. A good many engineers will say that the Government has taken a backward step in abandoning steel for shafts, but we think on the whole the action is wise.

John Roach has never had any of the iron shafts he put into steamers break, and the indications are that good iron is not so susceptible to the structural changes induced by fatigue as steel is. There is an impression among many mechanics that steel is treacherous, for it will break occasionally in an unaccountable way.

Cases where breakage occurs under strains that a steel article ought to have withstood without distress, might probably be traced to natural causes were the matter properly investigated, but this has not yet been done, and so long as "mysterious" breakages are common, the material will not have the entire confidence of the engineering world.

Accident on the Philadelphia and Reading Railroad.

On the morning of January 7, while a train of the Philadelphia and Reading Railroad was approaching Jersey City, and running at a speed of about sixty miles an hour, a chilled cast-iron wheel in the truck of the first car broke and derailed the train. At the place where the accident occurred there was a long side track filled with loaded coal cars. When the first car left the track, its front end swung over and struck the coal cars, smashing in the corner of the passenger car and severely injuring several of the passengers inside. The coupling between the engine and train parted and the locomotive ran on, but the train kept together, although some of the cars were forced away from their trucks. The brakes did their work very well, and, no doubt, kept the cars from pounding each other to pieces. The front car stopped about 700 feet from the point where it jumped the track, which was a good stop, considering the fact that several of the brake beams were torn away from their fastenings. The heaters used for warming the cars of this road are placed under the cars, and in this accident most of them were torn off and scattered the fire around, but it lay harmless on the frozen track. Had there been stoves inside the first car, some of the passengers would certainly have been roasted to death. Engine 169, which we illustrated in the columns of the AMERICAN MACHINIST two years ago, was pulling the train, and passed through the accident without damage.

A workman in San Francisco, who lost his arm through the breaking of the machinery where he was at work, has sued his employer for $25,000 damages. If the numerous workmen who have recently sustained serious bodily injury from the explosion of worn-out boilers could succeed in collecting damages from the owners, it would have a good effect in improving the condition of the boiler-making business. Boiler users would then perceive there was financial danger in using a boiler unfit for service. This seems to be the most practical way of reforming old boilers into the scrap heap.

A Great Railway Scheme.

Big railroad schemes are generally regarded as indigenous to America, but some European capitalists are agitating a railroad enterprise that, if carried out, will eclipse anything in that line ever undertaken. They propose establishing a through line of railway from London to Madras. The route proposed is Paris, Madrid, Gibraltar, Tangiers, Tunis, Tripoli, Cairo, Bassorah, Kelat to Kurachee, and Bombay. The nominal capital is fixed at £10,000,000. It is intended to profit by the existing railways in France and Spain, and to establish a steam transit from the Bay of Gibraltar to Ceuta in Morocco. From this latter point would begin the International Railway, the works of which would have to be constructed in Morocco. This line would form a junction with the system of railways under the administration of the French Railway Company in Algeria and Tunisia, giving communication from France to the various lines and branches in those provinces. It is then proposed to continue the route through Tripoli to form a junction with the Egyptian railway system. From Egypt the route to India will be continued to reach the Euphrates, and then along the coast of the Persian Gulf to the port of Kurachee in India. At that point the great Indian system of railways would be reached, communicating with Bombay, Calcutta and Madras. The entire line from London to Bombay has been calculated to extend over a distance of about 7,000 miles, and this distance, it is said, can be traversed in nine days at the average rate of 35 miles an hour.

A Locomotive Crown Sheet Comes Down.

On January 17 a locomotive belonging to the Hannibal & St. Joseph Railroad let down her crown sheet under peculiar circumstances. During the prevalence of a bad snowstorm, the engine got stalled at the foot of a hill near Laclede, Mo. The engine was uncoupled from the train and worked out with much difficulty, after which the engineer ran her up to the station. Here he found that the injector was frozen, and the water had got very low in the boiler. After much labor, and with the help of another engineer, the injector was thawed out and put ready to work. By this time the steam had gone down to 70 pounds, and the water had been away out of sight for some time. The engineer started the injector, and put in a fire to raise steam, and kept the blower going. The steam began to rise, and when it reached about 100 pounds the crown sheet gave way, about 80 staybolts pulling out from the overheated sheet. To the ordinary railroad man, the responsibility for this accident goes directly home to the engineer, who showed incompetency by permitting his injector to freeze up, and by forcing the fire when he did not know how low the water was. A western railroad contemporary, however, which is suffering under an anti-steel craze, attributes the accident to the crown sheet being made of steel.

Many disastrous explosions of gas have resulted from searching for leaks in pipes with open lamps. These are avoided in Paris by the use of an electric lamp, supplied by an accumulator, the use of such a light being enforced by the authorities.

He Needed a Long-Handled Shovel.

Recently a valve belonging to an Albany steam trap in use in a county building, was taken to a machine shop for repairs. It was so befouled and coated with dirt and grime, evidencing outrageous neglect, that the machine-shop proprietor asked how it came to be in that condition. The person who disconnected it and brought it in, said if the machine-shop man had seen him digging it out with a long-handled shovel, he would be able to answer his own question. From the neglectful manner in which steam-making appliances are sometimes cared for, the wonder is, not that parts may occasionally need repairs, but that mechanical devices can be used at all.

LETTERS FROM PRACTICAL MEN.

Boiler Tests.

Editor American Machinist:

In the AMERICAN MACHINIST of January 10, W. H. Odell in an article on "Destructive Hydraulic Pressure Test" writes concerning the Eufaula boiler explosion: "It would be interesting to know who is responsible for this enormous pressure on these boilers, if the figures, 280 pounds are correct."

In my article in the AMERICAN MACHINIST, Dec. 20, 1884, I gave the facts as I learned them, but it now appears that 280 pounds fell short of the test pressure. Since reading Mr. Odell's article, I have given the matter considerable attention and have been unable to learn of the boilers mentioned ever being tested. They were built for S. B. Steers, of New Orleans, the owner of the Morse Cotton Press, and erected by him for the Central Railroad under a guarantee for one year against all damage by accident. In placing an engineer in charge of the boilers and press, I quote from Mr. Steer's letter to Capt. Samuel J. Whiteside: "This will introduce to you Mr. James Oats, an engineer of twenty-five years' experience, who will take charge of the press during the term of my guarantee."

Mr. Steers had also erected at Columbus, Ga., a few weeks previous, a duplicate press and boilers, put up under the same guarantee. After the explosion at Eufaula the Columbus boilers were tested in the presence of their maker to 180 pounds hydraulic pressure. They were found defective and condemned. Had the Eufaula boilers been tested in like manner the explosion, in all probability, would never have occurred.

Instead of hydraulic pressure tests being a damage to boilers they are considered by the United States Government as indispensable. The government inspector tests the boilers on the steamboats here one-third higher than the number of pounds they carry. The tests the past year ranged from 240 to 275 pounds.

The new boilers for the Eufaula and Columbus presses were built by James Rees of Pittsburgh, who *voluntarily* had them tested to 300 pounds instead of 280 as your correspondent complained of, nor did Mr. Rees consider he was injuring the boilers. Before making them every sheet had a strip cut from it and put into the testing machine to see if it came up to the stamped tensile strength given by its maker, which was 76,000 pounds.

The boilers were of best material, and all the work done on them is first class in every respect. If they had been put into a river boat the government would test them for several years to upwards of 240 pounds.

I believe one cause of boiler explosions is from the fact that many boiler users send out for bids, and the firm who will make them the cheapest generally gets the job, therefore boilers are often made without regard to workmanship, and sometimes material as well.

If builders were fairly paid for their work, and none but the best material and workmanship allowed, you would not have to record such disaster. Nor would testing be considered dangerous, as testing can only affect poor boilers and shoddy makers of the same. I would like to hear from my friend and your old correspondent, George Marshall, on this subject.

ROBERT E. MASTERS.

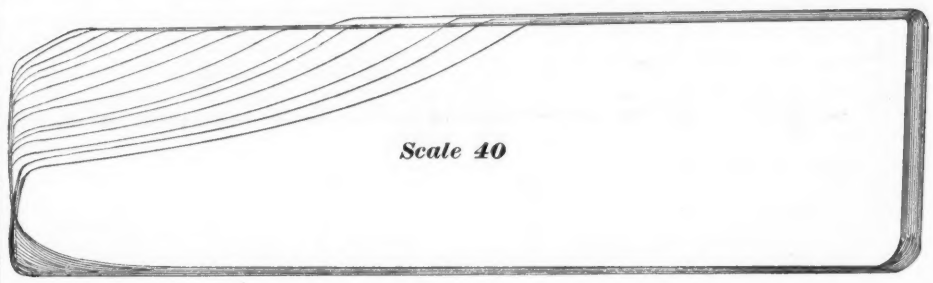
Effect of High Speed Upon Releasing Valve Gear.

Editor American Machinist:

In Questions and Answers for January 31, 1885, "J. B.," inquiring about the Corliss valve gear, asks, "Why can it not be used on high-speed engines?" As an illustration of your reply, "that the piston will move too great a proportion of its stroke while the valve is closing," the accompanying card is presented.

It was taken from an 8″×24″ Harris-Corliss engine, with the ordinary drop cut-off, in the Mechanical Engineering Laboratory of the Massachusetts Institute of Technology. Partly encircling the fly-wheel was a friction brake, so arranged that a load could be thrown on or off the engine as desired. Experiments to illustrate the effect of high speed upon this type of cut-off gear were conducted as follows:

The governor being blocked to cut off at the earliest point shown upon the card, the engine was started under the heaviest load it was able to carry, the throttle opened wide, the indicator connected, and the pencil applied to the paper. The load was then rapidly thrown off until the engine attained the highest speed at which it seemed safe to run. No record of speed was kept, as it was constantly increasing, but the final

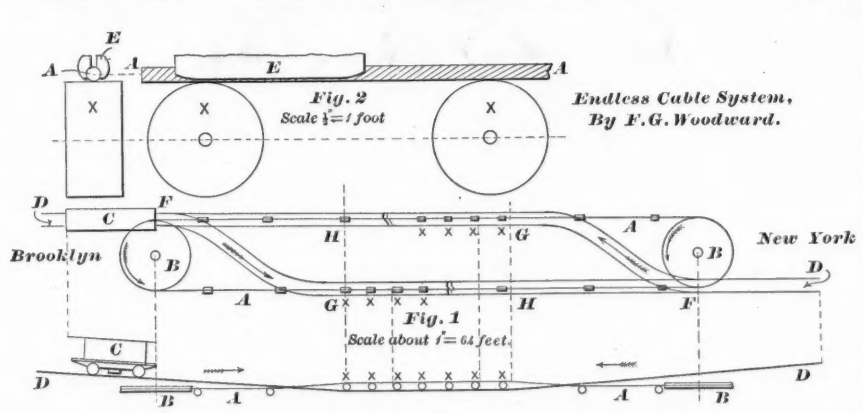


speed was probably from 150 to 175 revolutions per minute.

The governor having been blocked, it will be evident that the changes in point of cut-off were entirely due to the inability of the dash-pot to close the valve, upon its release, before the piston had reached the respective points shown upon the card.

The differing length of card, affecting principally the position of the admission line, was due to the fling of the indicator drum, aided by the stretch of the string, which was several feet in length. The combined effect of increased piston speed and higher pressure at release, upon the freedom of exhaust, is well illustrated by the change from a nearly square to a decidedly rounded corner upon the card.

Watertown, Mass. WALTER B. SNOW.



Car Transit by Endless Cable.

Editor American Machinist:

In an article upon this subject in the AMERICAN MACHINIST of January 31, it is stated, among other things, that if the cable moves with a continuous speed of eight or ten miles an hour the car should have a like headway at the instant it is attached to the cable, in order to avoid all shock and wear and tear of cable and gripping device. To bring about this important condition of things, the following scheme is presented: The desired headway may be given to car *C* by a short incline, *H D G*, at each end of the line, the momentum of the car being sufficient to impel itself up the incline from *H* to any desired position above the switch *F*, the car being held at this position by the car-brake till ready to start for the other end of the line. The car, then, being released, will move by its own gravity down the curve to the opposite track to *G*, attaining at this point of its progress a speed equal to that of the cable *A*. The brakeman now grips the cable firmly, and the car continues without slip or shock to the other end of the line, where the same process is repeated. The cable is held up to the range of the grip by a few plain-faced carriers, *X*, as shown.

The grip is formed somewhat as shown at *E*, Fig. 2, and being so attached to the car as to be capable of slight vertical play, no harm can result if the grip passes slightly in contact with these plain carriers, provided it escapes the grooved carriers along the line.

It is suggested, in the article above referred to, that "the cable might be raised to the range of the grip" by the weight of the car acting upon a suitably arranged lever at the foot of the incline. But in view of the slight elevation of cable necessary to meet the conditions of the case, it might be better to carry the cable permanently elevated, as indicated in the sketch. The plain carriers, *X*, should be placed close enough together to keep the cable *A* straight with the track for a distance of 25 to 30 feet, or a sufficient distance to give the brakeman ample time to operate the grip. The grip should be a simple clamp of considerable length, as shown at *E*, Fig. 2, lined with hard, slightly elastic rubber, conforming to the shape of the cable, as shown in end plan, Fig. 2, so as to preserve the integrity of the cable.

It will be observed that the cable is here represented as carried on a single sheave, *B*, at each end of the line, the diameter of the sheaves being equal to the distance between the center of the tracks *D*, and the sheaves being so placed as to carry the cable level with its working position along the line, as shown. In cases where conditions are favorable, this method of mounting the cable would be preferable to the more complex arrangement, as it would absorb much less money and power. One of the sheaves should be so mounted as to serve as a tightener to adjust the tension of the cable, and compensate for its variation in length from change of temperature. With due attention to timing the cars, so as to balance their work on the inclines, their absorption of power would be quite uniform and not excessive. The tractive power of wire cables working over large sheaves has been tested pretty thoroughly for driving heavy machinery, and has been found ample for pretty severe labor when applied simply as an open belt; and in cases where excessive tractive power is needed, a single turn of the cable around the sheaves has given ample adhesion for every emergency. F. G. WOODWARD.

Flue Cleaner for Upright Boilers.

Editor American Machinist:

In reply to inquiry of Sterling Elliott, in your issue dated Feb. 14, for a flue cleaner for upright boilers, I would say: Don't attempt to invent a scraper that will work from the fire-box, when you can work it more easily from the other end of the boiler. I was stuck as he was, a few years ago, with a 4 horse-power upright boiler, using soft coal. It worked well for two days, and then the fire would not burn for lack of draft. Took off the bonnet, found flues choked with soot; *invented* a scraper instantly, and made it in two minutes out of a bit of wire, twisted into a spiral at one end by wrapping it round a broomstick, and had the flues cleaned in five minutes more. I believe the same soot scraper is still used with that boiler. Make the bonnet, or at least one half of it, movable, and then clean the flues from the bonnet.

ENGINEER.

A Careful Railroad Manager.

Editor American Machinist:

The name of the new general manager of the Baltimore & Ohio Railway I suppose to be Dunham, instead of Dunning, as you have it in issue of February 7, page 7. A much better showing could be made out for Manager B. Dunham than that given in your February 7th copy of AMERICAN MACHINIST. He is a remarkable man. While manager of divisions of the Baltimore & Ohio Railway, west of the Ohio river, he accomplished what was beforehand regarded as an impossible feat, viz.: completely "headed off" petty thieving of fruit, etc., by railway employees by vigorous use of lead seals upon packages, car doors, etc. Also he would go into a locomotive fire-box, find defects where others failed, and would with equal facility direct the erection of break-waters to save bridge foundations, etc.

Columbus, O. S. W. ROBINSON.

Union Meeting of Locomotive Engineers.

On February 8 there was a union meeting of the Brotherhood of Locomotive Engineers held in the Grand Opera House, New York. The meeting was held for the purpose of bringing the members of the organization together for social intercourse. Most of the railroads running into New York ran special trains, to enable engineers living on distant divisions to be present. About 600 engineers attended, some of them being among the oldest men in railroad mechanical service. Grand Chief Arthur was present, and addressed the meeting at great length on the work done by the Brotherhood. It originated 21 years ago last April, in a small town in Michigan, and at first consisted of twelve members, who called their association the Brotherhood of the Footboard. Next year forty-four divisions were formed, and the name changed to the Brotherhood of Locomotive Engineers. During the time the Brotherhood has been in existence, it has paid over $1,600,000 to holders of insurance policies, and over $500,000 for charitable purposes. The insurance paid to widows and orphans has in numerous cases bridged the chasm of want, and many a member has been arrested on a downward course and brought back to true manhood by the restraining influence of the Brotherhood. Mr. Arthur gave the details of numerous disputes, between railroad companies and their engineers, that had been settled amicably through the efforts of the Grievance Committee.

Locomotives Making a Good Record.

The fast locomotives running on the New Jersey Central Division of Philadelphia & Reading Railroad are making excellent records for durability and economy in the hard service to which they are subjected. Engine 172, John Cline, engineer, made 82,000 miles before the valves required facing. All these fast engines have the Allen valve with the Richardson balancing device. Before these valves were balanced it was a hard matter getting them to run two thousand miles without facing.

Engine 165, John Rhodes, engineer, on the same road made 130,411 miles on express train running before she was jacked up. Even after this record of continued hard work the engine was in good order and would not have been taken into the shop, but for fear that some of the unseen parts were worn out. The fire-box needed no work and the principal boiler work done was taking out and resetting the flues. The repairs required on the machinery were equally light. These engines were designed by Mr. Woodcock, master mechanic of the road, and he has had the honor of having his engine adopted by several roads for their fast trains.

The Indicator Diagram.

BY F. F. HEMENWAY.

The diagrams shown in Figs. 38 and 39 were sent me, with a request for an explanation of their peculiarities. That shown in Fig. 38 was engraved as sent, while in 39, a diagram from each end of the cylinder being represented, one of them is shown in dotted lines for the purpose of rendering an explanation easier.

Diagram 38 is simply a case in which compression is higher than initial pressure. The exhaust closes at *d*, and the pressure rises by compression to *e*, then when the valve opens for admission, the pressure falls instead of rises in the cylinder, which accounts for the loop below *e*. If the engine had been doing considerably more work this would not have occurred, as the steam line would start as high as compression would be carried. If this light load is only of occasional occurrence, it does not matter much, but if this diagram represents the average load, means should be taken to reduce the compression, or what would be still better, the engine should be speeded slower.

The three steam lines shown represent the effort of the governor, for three revolutions, to maintain regular speed against variation in load, or other disturbing conditions.

The diagrams in Fig. 39 were somewhat confusing in the original, but engraving one of them in dotted lines clears up the mystery. It appears to be a case of derangement of steam valves, the exhaust valves performing their functions correctly. Referring to the diagram in dotted lines, the steam valve does not open until the piston has made about one-third of its stroke, or at *a*. Cut-off takes place at *b*, and exhaust opening at *c*. At *d* the exhaust is closed, and compression is carried to *e*. Then the piston commences its forward stroke on the steam that has been confined in the cylinder by compression, the pressure behind it falling by expansion to *a*, where the steam valve opens.

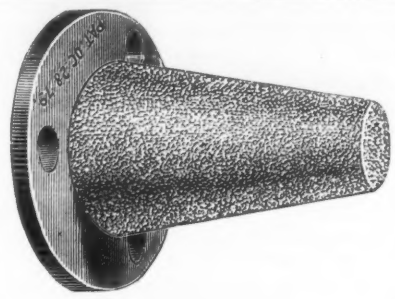
The full line diagram can be similarly explained.

A Bilious Editor.

The *Iron Age* thus relieves itself of superfluous bile:

Since the 1st of January a vast amount of printer's ink has been consumed in publishing correspondence from business men, manufacturers, and others, respecting the condition of trade and the outlook for 1885. A score or so of enterprising journals in various parts of the country have adopted this expedient for attracting notice, and these drag-nets, in the shape of circular letters, have brought to shore a queer collection of "views." We have no reason to criticise an editorial policy which discovers value in this class of contributions, for they may have another value than appears in their very limited interest as reading matter; but we venture the opinion that the best way to get at the facts is not to open the columns of a newspaper to a deluge of crude, undigested opinions from the class of men who are likely to feel flattered by invitations to write letters for publication. The sources of information open to such gentlemen are also open to an intelligent journalist, and he can make better use of crude material than the average man of business unaccustomed to writing.

Five years ago the AMERICAN MACHINIST, about the last week in December, addressed an inquiry to a considerable number of its patrons and friends, asking about progress and improvements during the year, and prospects for the year to come. The replies were published, and received wide attention, as much specific and interesting information was given. We have made the same inquiries every year, with like satisfactory results. Several of our contemporaries have since followed our plan, and doubtless find it satisfactory. The remark of the *Iron Age* about "crude, undigested opinions" of "business men unaccustomed to writing" is veritable bosh. Almost any intelligent business man can make a better review of trade, in his line, than the long and labored essays the *Iron Age* inflicts upon its readers.



Conical Emery Grinders.

These are made in a variety of sizes, and in general shape as represented in the engraving. They are useful for grinding the inside bevel of gauges, moulding cutters, dies and irregular cutters of all descriptions, for grinding the inside of rings, bows of shears, and for a variety of purposes that will readily suggest themselves.

They can be attached to any mandrel or shaft that has a screw end, by means of a face plate or a block of wood, or they may be used in an ordinary chuck.

Manufactured by L. D. Cogswell, 350 West Adams street, Chicago, Ill.

Some Thoughts About Steel.

BY S. W. GOODYEAR.

Can there not be an interesting chapter built from the exaggerated opinions in relation to steel and its characteristics, which are entertained by those who have no practical knowledge on the subject?

First, as to what is steel? Some believe it to be a metal which can be obtained by simply smelting "steel ore" in the ordinary way by which iron ore is reduced to pig iron, and strange as it may seem to practical iron and steel workers these persons may be found by the thousand, who tell the story of whole mountains of "steel ore," the product from which without other manipulation than simply "melting down" could be reheated and forged to any shape; "razors have been made from it to compete with the best imported ones! Fact." Next comes a class who see millions in new processes for the manufacture of steel, always of the "very best quality" from scraps and odds and ends of all sorts; cast iron, and wrought iron, and steel scrap in any shape in which it can be found. Old barrel hoops, horse-shoes, nail stubs, stove plate, car wheels and cannon, and, to cap the climax, tin scrap—anything, everything in which iron or steel exists in large quantity, or small, may be "put through," and if carefully weighed first, and the resultant steel weighed it will be found that there has been an actual gain; and the quality beats the best brands of either imported or American. "Why! with a roughly forged butcher knife a man was shaved, and he said he had never seen a razor that cut as well! Fact!"

Then comes a class who are carried away with a grand idea on the strength of which stock companies are to be organized with millions of capital! "Stock nearly all taken! Better take some, sure to pay 100 per cent. I am going to put all I can raise—and shall even borrow some money—into it." Who has not listened for hours to such "word painting" on a foundation of the thinnest sort of air?

"What is it? What are you going to do?" were the questions put to a would-be millionaire of this stripe, when he stopped to breathe after a solid half hour of explanation as to organization and prospective dividends of a company in which the word steel had been mingled with the names of patentee, and projectors of a scheme whereby under a patent more money was to be made in a year than could be taken from the richest mine between the Rocky Mountains and the Pacific. "Going to make steel coated iron, and iron coated steel." What for? "Oh, for lots of uses. There are a great many uses to which steel is put where it would be better if the interior was iron, and also cases where iron on the outside and steel for the interior portion would be found vastly superior to iron. Mild centered steel can be furnished to parties who don't wish to have it hardened clear through. The strength of iron will be combined with the hardness and durability of steel. It will revolutionize the entire steel manufacture of the world! Patents have been secured, or applied for in all countries where there is a patent system." "Yes. Are you a steel worker? Do you know anything about steel in a practical way?" "No?" "Well, steel is much stronger than iron anyhow; now how will you increase the strength of a bar of steel by putting inside of it the weaker material, iron? Or, if steel is strongest, why coat the bar of steel with iron, when there is not the slightest doubt that all steel is strongest? If a bar of steel of any considerable size *cannot be hardened* clear through, why mild centered steel to *prevent* doing what *can't* be done? If the best condition in metals is that of homogeneity why put two materials of different characteristics together?"

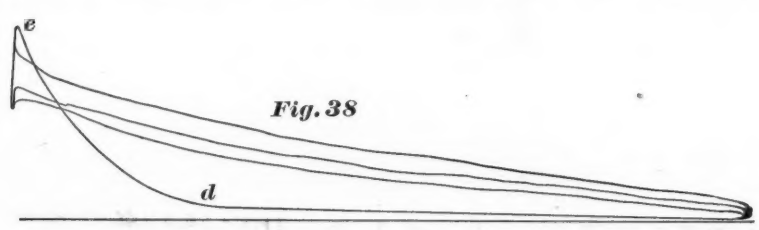


Fig. 38

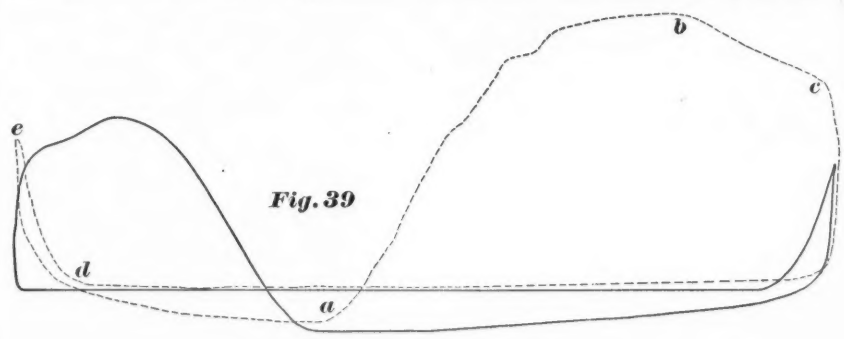


Fig. 39

How many such questions could be fired at the man who is going to invest and wants his listener to do the same before he will grow uneasy under fire? He will say, perhaps, "Well, steel won't bend without breaking and iron will, and when you put them together —." "But, if it would break a piece of steel to deflect it a certain amount by itself, why if it is of the same character when surrounded by iron, or surrounding iron, should it not break under the same deflection; don't you know that steel will bend even to being turned back upon itself and hammered down close without showing the slighest sign of breaking?" "No?" "Well it will, and can be twisted around and around to an extent which would convert any but the soundest of iron into strands like those of a rope, and still the steel remains sound." How long will it be under a scattering fire like this before the subject will change, and the weather, politics, anything but steel will be talked about, while the patent process boomer concludes he will find out more about it, before he, by the enthusiastic representations of the organizers, is induced to buy stock?

In the every-day small talk about steel by those whose occupation has not led them to inform themselves to any great extent in relation to its nature and uses, there is much of mirth-provoking blundering as reviewed by those who are daily manipulating, or observing the results of manipulation, of this most wonderful and little understood material. Articles are lauded to the skies because made of steel in cases where iron would be better. Steel is condemned as unfit and unsafe for uses in which it would be just as safe as iron, and vastly superior in every way. "Every piece of the iron-work in that wagon is best cast-steel," says one, while another declares that he would not, if he knew it, ride in a wagon having steel axles and tires. They are unsafe, he says, nor would he put a steel shoe on a horse—"won't spring or give a bit; liable to break and ruin the horse."

Wise people there are who use cutting instruments, whose education steelwise has been so limited that the working, hardening and tempering of steel is to them a myth, but who select from the stock in a hardware store the very best by unfailing tests, such as suspending and tapping with some metallic substance, and judging the quality by the ring. Says such an one, "I never fail to pick out the best." Well, hardly ever. Then there are those who tell by breathing on the polished surface, and carefully watching the vapor pass off. They will, unless remonstrated with, go clear through a stock of pocket cutlery, testing every blade, mayhap to select in the end a single-bladed knife costing a quarter of a dollar, and leaving the seller, if his time is worth anything, to spend dollars in patient labor with chamois to remove the moisture.

There was once upon a time a good woman who had an unfailing method for testing starch. She said she always tested it. Said she, "Put it in water, and it will sink or swim, and for the life of me I can't remember which." So with the vapor test of bright tools, so annoying and detrimental, it is likely that there would be some doubts and disagreements as to what rules should govern its application.

Boiling water or hot meat will take the temper out of a carving knife, we are told by those who have no idea that the temper was fixed by a heat three times as great, which must be exceeded before the temper will be changed. Strange, is it? Well, no, not very, when it is considered that among those who really know the most about steel there is a great variety of opinion, as to the whys of some of the most simple and unerring results which come under the observation of the steel-worker, who contents himself by saying, "Because it does." In undertaking to become thoroughly informed as to the reasons for the many conditions in which steel may be placed, by reading from not simply writers who speak from the books, but from those who combine with published knowledge that of experience and observation, it is surprising to note how often such expressions are used as "probaby," "possibly," "course not," "thoroughly understood," "maybe," "possibly is," "has been thought to be," "opinions differ," etc., etc.; and, while the practical steel-worker can find an abundance of the most positive statements in relation to the chemical and physical structure of steel which he cannot understand, and about which he cares but little, he finds that to his own questions why certain results in his practice follow certain causes, the answer is, or might as well be, "don't know."

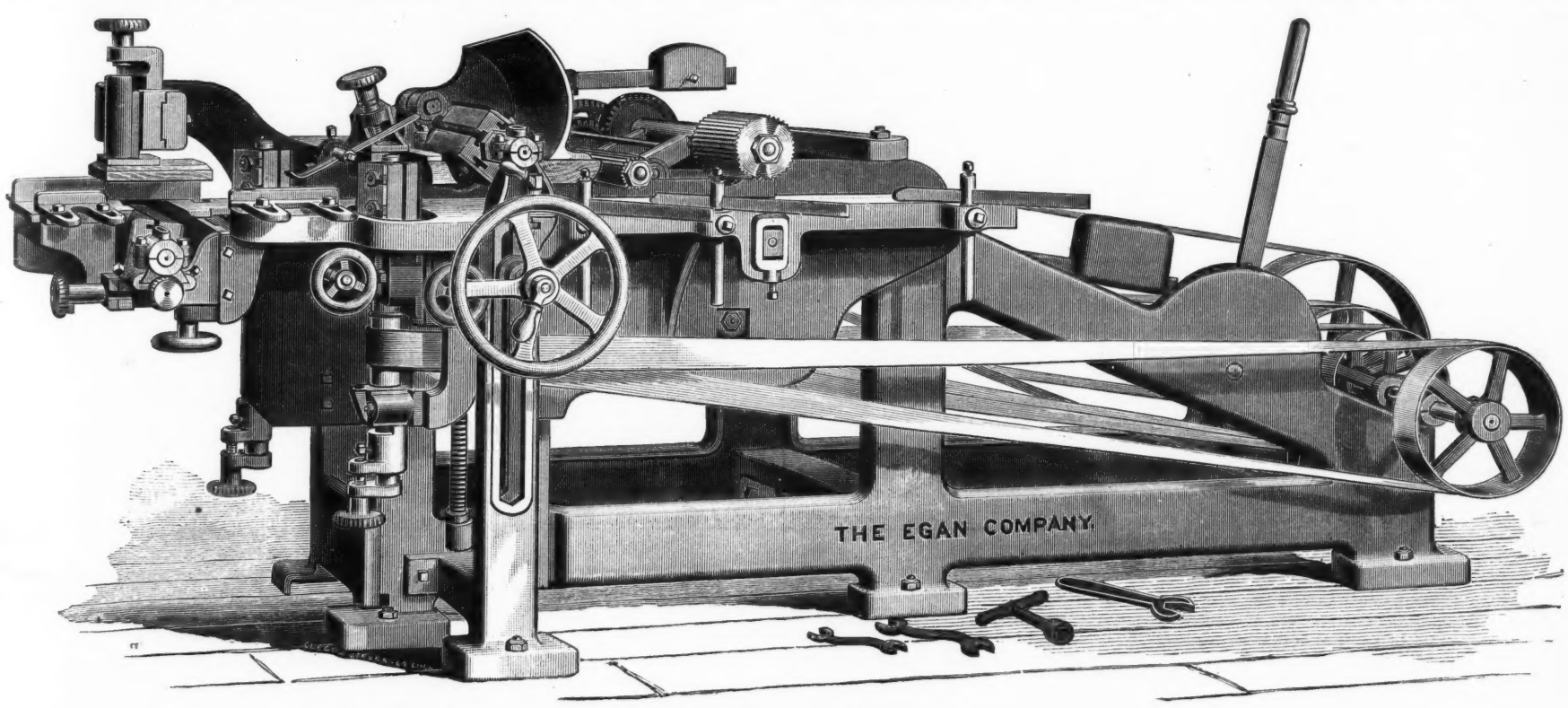
How is wrought iron converted to blister steel? Answer from man in charge: "By filling the converting furnace with alternate layers of bars of iron and charcoal, sealing all up with clay and running the fire for several days." The manufacturer, with much scientific knowledge added to his practical information, says: "That only answers the question from the simplest mechanical standpoint. I will tell you *how* the converting furnace, charcoal and fire change iron to blister steel. When iron is made into steel in a converting furnace, it is assumed that the oxygen in the air in the converting pot

unites with the charcoal, and is soon made into carbonic oxide, which is occluded by the white hot iron, and forced by it to part with as much carbon as is sufficient to reduce it to carbonic acid. It has been ascertained that metals have the power of absorbing or occluding many times their own bulk of gas, and possibly the carbonic oxide, when it has parted with the amount of carbon necessary to reduce it to carbonic acid, is not then expelled from the iron, but may remain in an occluded state, and requires to be expelled in the melting pot by boiling. Be this as it may, it is a fact that, if it be required to make blister steel harder than about ¼ per cent. of carbon, it is necessary to convert it twice over, possibly in order that in the interval it may part with some of its occluded carbonic acid, so as to make room for a further occlusion of carbonic oxide." Another fact.

But how are we to feel sure, even if we understand it all, that we are getting facts, when our teacher takes no stronger ground than to say: "It is assumed," "possibly may remain," "be this as it may," "possibly." His explanation is very interesting and instructive, and *possibly* may be the best there is, but for a compilation of facts does he not put in too many "perhaps"? Let us follow him up to some positive assertions. He gives a thoroughly clear and detailed description of the converting furnace, with its pots and all the mechanical operations connected with its use. The melting furnace and crucibles, with their manipulation down to the minutest detail, are described with a clearness which is admirable, and so on through page after page in faultless style and unexceptionable language does this writer describe the entire process of crucible steel-making in the most positive terms, without the shadow of a doubt expressed in relation to the proper methods for performing any and all of the great variety of purely mechanical operations which are left to the *men*, who, having once learned *how*, "do it *so*, because that is the way." They can execute all that has been so beautifully described, and can apply mechanical tests to prove the correctness of their methods by the quality of the product, but most of them would make a sorry job of writing for publication what they know, and they need not undertake it, for it has been done for them in a manner not to be improved upon. But the "whys," here is where the plain, practical man wants information. Let's quote again: "The fact that the presence of manganese or silicon helps largely to kill the steel may possibly be accounted for on the theory that the carbonic acid unites with the manganese or silicon and becomes a solid, or it may be that in an alloy of iron with either manganese, silicon or phosphorus the occluded gas is expelled at a much higher temperature than in pure iron." Which — either or neither? Comparing the steel manufacturers' methods and opportunities of earlier days with those of their more favored successors, our modern teacher says: "Chemical analysis was unknown in the trade; the despotic sway of the rule of thumb reigned supreme"—still referring to the ability of experienced men to select and classify the different steels by ocular inspection, from the difference in appearance caused by differing percentage of carbon—the practical method in every-day use. He says: "An experienced hand will detect a difference between, for example, 1.3 and 1.35 per cent.;" and he might have moved the 5 one place to the right, with a cipher between it and the 3, and still have found the experienced eye to verify his statement. To the description of processes, the practical men in a steel-works could only say: "Right." To the "whys," they must say, "don't know." How often the writer from whom we quote says virtually the same thing!

Following up the statements of the writer above quoted, in one of the most readable and instructive of papers, as he leaves the subject of manufacturing and comes to that of the varied uses to which steel is put, we find him quite positive. There are fewer "perhaps, possibly, and may-be's," and now we steel workers feel that we know more about the matter ourselves. Quoting, we find that: "Hardened steel has most of the properties of glass; being very hard and brittle. Tempered steel has most of the properties of whalebone, being hard, but at the same time elastic. * * If the temperature be raised above a certain point, the steel becomes what is technically called 'burnt,' and the amount of hammering which it would require to restore its fine grain would reduce it to a size too small for the required tool, and the steel must be condemned as spoilt." Let a steel worker tell how this is, and give his answer to the why's. Hardened steel has or has not the properties of glass, just as its treatment in forging and hardening has been correct or otherwise. It may be, while very hard, very elastic, very tough. Tempered steel, even with the temper drawn too low for any practical use, may have none of the properties of whalebone, but used as a tool having a cutting edge crumble as easily as glass. Why? Because it was heated too hot for forging, annealing, or hardening, or for all three, but more especially the latter. Why should the hardened tool, with temper undrawn, show the elasticity of whalebone more than the hardness of glass, and carry an edge for hours in cutting cast iron, wrought iron, steel, or even chilled iron, without a sign of crumbling? Because it was worked and hardened at the proper heat. To the statements of our teacher, in relation to hardened and tempered steel, let's say, *not always; not necessarily.* Of course, we are only steel workers, and don't know much about the occlusion of gases, but when it comes to what may be done with a good piece of cast steel, why, that's our strongest hold.

About the *necessity* for hammering to restore the "burnt" piece, lets say *No sir.* Heating and cooling—no restoring compounds in this—in the proper way will restore the "burnt" steel to have a grain as fine as silk. Why? Because by raising the heat to the proper point and permitting the "burnt" steel to cool off slowly as for annealing, once, twice, or more times as required, it gives an opportunity for a rearrangement in their normal condition of the molecules composing the mass which had been violently disturbed by an excess of heat. In cases where the fact that steel is burnt is arrived at by the coarse condition of grain, the hardening process has usually taken place at the too great heat which caused the coarseness of grain, the sudden cooling having caught and held the steel in the abnormal condition caused by too high temperature, when if permitted to cool off slowly, the "burnt" steel though injured past *entire* restoration, would have been so far restored, or by a subsequent proper heating and cooling may be so far restored that hardening will bring the grain to a condition of fineness not found in "hardened steel which is brittle as glass." "Rule of thumb."



IMPROVED MOULDING MACHINE.

Improved Moulding Machine.

The engraving on this page represents the new four-sided moulding machine, made by the Egan Company, Cincinnati, Ohio. It is a strongly constructed and powerful machine of its class, embracing in its design and construction recent improvements made by that company.

The frame is heavy and strongly braced, and is long, giving large pulling capacity to the belts, and insuring easy running.

The main spindles have three journals, running in self-oiling, "nicked" babbitt boxes. The stand for outside bearing extends to the floor, and is braced by a solid projection of the frame. No bolts or outside boxes require removing to raise or lower the bed.

The side heads, with their spindles are raised and lowered with the table, and all spindles are adjustable, while in motion, by means of hand wheels on the front side, a matter of great consequence to the operator.

Every head is provided with approved chip-breaker, that effectually prevents tearing of the wood.

The feed consists of two rolls above the bed, and one in it. By the expansion system used for driving the lower rolls the bed can be lowered 16 inches without decreasing the power of the feed. The feed has four changes. The upper feed spindles are hung in links, so that the feed roller raises even, giving for all positions a full and equal bearing on the board.

Making Steam Engines Economical.

In selling steam engine attachments and improvements, the man who can demonstrate that his attachment is going to effect a large saving is the party who gets most customers. Unless there is some psospect of a device affecting a saving of from 10 to 50 per cent., few engine-owners or steam users will listen to him. There are sometimes curious ways of proving that a saving has been effected. A well-known engineering expert once had occasion to examine the engine of a steamer on one of the inland lakes. He found it in a bad shape, and wished to have some repairs done. The owner would not listen to the suggestions till he heard there was a probability of saving 20 per cent. of coal at a small outlay. The cylinder was badly out of rouud, and the practice was followed of jamming the piston packing in very tight to prevent leakage as far as possible. Owing to this, the engine would not move till the boiler had a pressure of 20 pounds of steam. The expert had the cylinder bored out, and put in good steam packing. When that was done and the engine lined up, he had steam raised. So soon as there were 10 pounds of steam shown on the gauge, he called out to cast off and get the boat out. The owner protested that there was no use trying to start out till they had more steam, but the expert insisted there was pressure enough and the engine was started, and the boat moved out in good shape. The owner was so astonished at the immediate improvement that he paid for the work without any more trial.

This same expert wanted to put a balanced valve and some other small improvements on a river steamer. The owner did not care to incur the expense, but was brought round by a promise that the engine would make ten more turns. The old valve was leaking badly and was not properly set, besides the engine needed lining up. The expert gave the engine a small overhauling at the time the balanced valve was put in, and had no difficulty in getting the ten additional turns. We believe that in a great many instances it will be found that the inventor expects to get part of his saving through his skill in directions not entirely connected with the device he sells.

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☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

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NEW YORK, FEBRUARY 28, 1885.

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Breakage of Steel Rails.

During the last few months there has been an alarmingly large increase of fatal railroad accidents, caused by broken rails. Railroad men attribute this to the unusual severity of the winter weather, which keeps so many read-beds in a hard, unyielding condition, permitting the wheels to strike very destructive blows where inequalities of the track exist. This explanation of the phenomenon is perfectly intelligible, but it conveys no excuse for the accidents happening any more than other common abnormal conditions justify the occurrence of serious accidents. When a sudden flood washes out part of a railroad track, and a train runs into the break with fatal results, the railroad company is not exonerated from blame because they were not notified in time that a heavy rainstorm was coming; and when a railroad bridge breaks down under the strains imposed by unusual conditions, such as a tremendous windstorm and two heavy trains striking the structure at the same time, these circumstances do not excuse the company from the blame of the resulting disaster. These are weak parts of the railroad system, and it is the duty and business of railroad managers to provide precautions against weaknesses that might entail danger to life or limb. A broken rail comes under the same category. It is a point of weakness, and a direct proof that an important part of a railroad structure was too weak to resist the shocks and strains to which it was subjected.

Since steel rails were introduced, the railroad companies have continued increasing the size and weight of their rolling stock, and the speed of trains has also been materially accelerated, till the rails which carried trains safely ten years ago are not sufficient to endure without danger the blows from the cars or locomotives now in use at the speed the blow is struck. Although trains in Britain maintain a higher average speed than those run on American roads, accidents from broken rails are almost unknown there, the cause of this exemption from breakage being due to the great weight of rail employed. While our leading railroads are using rails weighing from 50 to 60 pounds to the yard, British roads doing similar work have rails weighing from 65 to 85 pounds to the yard. American engineers assumed that steel rails could not be overloaded by ordinary railroad locomotives or cars, and they introduced rails that were too light in the first place, and the breakages due to inherent weakness are now manifesting the mistakes made. There are many thousands of miles of railroad track laid with steel under 60 pounds weight to the yard. Every train that rolls over this track takes part of the steel away, so that the rails are getting smaller and weaker every year. As this weakness grows, the increase of accidents from breakage will go on. The interests of safety already demand that the steel rails on many roads should be renewed with heavier patterns, or that the weight on locomotive drivers and cars should be reduced.

Perpetual Motion Schemes Depressed.

In looking up the condition of various mechanical enterprises at the beginning of this year, we incidentally inquired into the progress of several schemes that were highly puffed last year, but have failed to maintain commercial vitality under the most vigorous stimulants. It is gratifying to notice, that the perpetual motion schemes which were thinly disguised under high sounding corporate titles are under a cloud this season, some of them hiding their diminished heads from the observations of a critical world. The boilers that were going to generate steam without expenditure of coal are cold as the consciences of their projectors, and the engines that were to supply power without expenditure of energy are silent and motionless. Some of these schemes were floated by companies having enormous nominal capital. It is to be hoped that none but people who were able to lose their money, without entailing financial distress, were induced to invest in the stock of the companies. As this thing appears to travel in a circle, and fraudulent mechanical schemes come round periodically, we would earnestly urge parties who are requested to invest their money in companies that are to become suddenly rich by controlling new inventions, to consult with some well-known mechanical engineer regarding the matter before they put a cent into them. When a man gets into a law suit he does not generally attempt to manage his own case, but employs a reputable lawyer, who understands the business. Yet, in too many cases, this same man will read over the prospectus of a company that promises to revolutionize the application of power by a complex machine, and he acts wholly upon his own judgment without advice as to merits of an appliance whose principle of action he knows nothing about. Were all men well-grounded in the elementary laws of the universe they would not be liable to fall into the error of believing that something can be got out of nothing, but many men seem to forget all they ever learned of physical science as soon as they leave school and they readily tumble into the pit-falls dug by a sophistical prospectus.

In this connection we observe that as a new enterprise it is announced that the Triple Thermic Motor Company of Greenfield, Mass., will set up an engine in a shop, and that an attempt will be made to generate steam for power purposes by the use of bisulphide of carbon. H. D. Watson proposes to spend $5,000 in perfecting the invention. If we remember rightly a company with capital named as reaching into the millions of dollars was going to develop this invention last year. If that capital is spent the invention is rather hard to put on a working basis.

Sixth Catalogue of the Mechanical Engineers.

The Sixth Catalogue of the American Society of Mechanical Engineers has been issued under date, January 1st, 1885.

Starting from the meeting for organization, which was held in the office of the AMERICAN MACHINIST, February 16, 1880, the Society has grown to include a total membership, in all classes, of 557, resident in 30 States and Territories, with a number of Canadian and foreign members. The names of two of the engineers who attended the original meeting for organization, viz., Henry R. Worthington and Alexander L. Holley appear in the death list, which now numbers 15 in all. The future prospects of this Society are all that could be wished. New and revised rules for its government were adopted November 5th, 1884, and it is to be hoped that hereafter very little of the time which should be used in the practical work, for which the Society was organized, will be spent in discussing proposed alterations.

The new catalogue contains full information for persons desiring to join the Society.

Applicants should address F. R. Hutton, Secretary, 15 Cortlandt Street, New York.

Fulton on His Inventions.

It is curious how an author will sometimes over-estimate one of his works which a discriminating public declares to be mediocre, while the same writer will under-estimate another work that the world declares to be his best. The same tendency is occasionally observed among inventors in regard to the products of their ingenuity. We recently came across a good instance of this in looking over an old magazine, where a letter written by Robert Fulton in 1807 to an intimate friend was published. The steamboat invention revolutionized the methods of navigation all over the world, yet Fulton regards that invention as unimportant compared to his torpedo system, which the world then declared to be impracticable. The letter says:

"Having employed much time, money and zeal in all this work, it gives me great pleasure to see it answer so fully my expectations. It will give a quick and cheap conveyance to merchandise on the Mississippi, Missouri and other great rivers, which are now laying open their treasures to the enterprise of our countrymen. And although the prospect of emolument has been some inducement to me, yet I feel infinitely more pleasure in reflecting with you on the immense advantage that my country will derive from the invention.

"However useful this may be, it is not half so important as the torpedo system of defence and attack—an object of infinite importance to the welfare of America and every civilized country. But thousands of witnesses have now seen the steamboat in rapid movement, and they believe; they have not seen a ship-of-war destroyed by a torpedo, and they will not believe. We cannot expect people in general will have a knowledge of physics, or power of mind sufficient to combine ideas and reason from causes to effects, but in case we have war, and the enemy's ships come into our waters, if the Government will give me reasonable means of action, I will soon convince the world that we have surer and cheaper modes of defence than they are aware of."

Forcing Patented Devices into Use.

Considerable labor is being done in the lobbies of Congress to compel people to adopt certain patented inventions. Several years ago there was considerable agitation about getting out palace cars for the accommodation and comfort of live stock that had to be transported by rail. Several patents were got out for cars that supplied a separate berth for each animal. Some of these cars were models of elegance, yet the soulless railroad corporations declined to build their stock cars after the new styles, and stock shippers called the pretentious inventions impracticable humbugs. A company which controls one of these patents is determined that railroad companies and hard-hearted shippers shall not be permitted to trifle with the feelings and comfort of the western steer much longer. The company has got influential friends, and a bill has been introduced compelling the recalcitrant railroad companies and stock shippers to give cattle the privilege of riding in palace stock cars.

For several years past great anxiety has been manifested to compel steamboat owners to put the Edson Recording Gauge on their boilers. Legislative enactment was invoked, but the statutes were so unskillfully drawn that boiler owners were able to get along without the gauge without incurring any penalty as law breakers. Those interested in the tax that would be collected from steam users, were the employment of the gauge made obligatory, are now trying to close up the gaps through which the steam users formerly escaped.

How Juvenile Train Wreckers are Treated in England.

One of the commonest forms of malicious mischief in this country is that of boys, and even men, placing small obstructions, such as stone, wood, rocks and splice bars on the track to see how they would make the locomotive jump. We have even known of a farmer driving an old, worn-out horse into a cattle-guard with a view of making an involuntary sale of the animal to the railroad company, and then go off to a distance and watch its effect on an approaching train. If the Draconian laws in force in England against such offences prevailed here, amusements of this dangerous character would be indulged in at more risk to the joker. An English paper recently reports the case of a boy who was tried for placing an obstruction upon a railway track. The judge mentioned that the criminal was liable to penal servitude for life, but owing to his tender years he sentenced him to one month's imprisonment, and to be well flogged with a birch rod.

One of the unexpected impediments to business for a week or two past, has been adverse weather in the Northwest. Trains have been snowed up in several States, and railroad traffic seriously delayed.

Our letters from the 91 new congressmen elect giving tariff views, with our summary of the position of the next House on the question of Protection have been commented upon by a large number of daily and weekly papers throughout the country. Various opinions have been expressed, which we shall refer to in a future issue. We shall also present two or three more letters from members-elect.

Mr. M. N. Forney is engaged in re-writing his "Catechism of the Locomotive." He is also preparing a new catalogue for the Rogers Locomotive Works, which will be a model of its kind.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(67) E. M., Lockport, N. Y., who inquires for a rule for angles, is referred to an article by Frank H. Richards, in the AMERICAN MACHINIST of June 9, 1883.

(68) E. M., St. Agathe, Canada, asks our opinion of a cut-off device for steam engines, about which we can form no opinion without seeing drawings or having further particulars.

(69) W., Waterbury, Conn., asks: What is the best kind of varnish to use for drawings to preserve them from dirt? *A.*—White shellac cut with alcohol is good for this purpose. Apply sparingly with a soft brush.

(70) F. W., Newark, N. J., writes: I have a vertical engine 5″x5½″, which I want to use for a boat. Please give me dimensions of boiler suitable for such an engine? *A.*—Vertical boiler, 30″ diameter, 5′ high; fire-box, 25″ diameter, 30″ high; 36 tubes, 2″ diameter.

(71) T. H. W., McGrawville, N. Y., asks: What is the horse-power of some of the largest ocean steamships, and how much coal do they burn per day? *A.*—Some of them are worked as high as 13,000 horse-power. The largest, will, on an average, burn something over 300 tons of coal per day.

(72) C.W. S., Philadelphia, Pa., asks: In a pulley with four, and one with five arms, with two set-screws in line, and a key, where would you put them? *A.*—We should put the set-screws midway between two arms, and the key from one-quarter to one-third the circumference either way from the set-screws.

(73) A. D. T., Philadelphia, Pa., writes: We have a 3″ flange union between two boilers, and the packing is constantly burning out. Is there anything for packing this union better than sheet lead? *A.*—We should consider sheet lead about as near worthless for the purpose named as anything that could be used. Asbestos packing, which you can get from dealers in such supplies, will probably be entirely satisfactory. Rubber, or drawing paper soaked in linseed oil, is better than the lead.

(74) T. A. S., Holden, Mo., asks: 1. Is it necessary to make a locomotive fire-box from 60 to 70 inches deep? Would 20 or 30 inches not do as well? *A.*—Master mechanics and locomotive designers generally make the form of fire-box that experience proves to give best results, so on that basis a deep fire-box may be regarded as a necessity. 2. Can a single-cylinder common slide-valve engine be made so that it will not stop on the center? *A.* No. Not without using a counterbalance weight to keep it from stopping on the center.

(75) P. B., New Haven, Conn., asks: 1. Is it practicable to make a two-cylinder single-acting compound non-condensing engine, and would there be any economy in doing so? *A.*—It is perfectly practicable, and such an engine could be made to work with fair economy. 2. Should not the light on a mechanical drawing be supposed to come from the left hand upper corner, and if so, why? *A.*—It is customary in drawings in elevation to suppose the light to strike the drawing as indicated, because it is essential to have uniformity in this respect. It should strike the drawing obliquely so as to permit the shading of both horizontal and vertical lines.

BUSINESS SPECIALS

Transient Advertisements, 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Curtis pressure regulator and st'm trap. Feb.21, p 15.

Private line telephones. W. E. Lewis, Corry, Pa.

Presses & Dies, Ferracute Mach.Co., Bridgeton, N. J.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Herbert W. T. Jenner, Mechanical Engineer and Solicitor of Patents, 632 F st., Washington, D. C.

The Young Engineer's Own Book, $3. Edw. Meeks, Publisher, 1002 Walnut St., Phila., Pa.

For Sale—26″ b. g. drill presses, quick ret'n bal. spindles, new, modern tools, $150. S. M. York, Clev'd, O.

Light fine interchangeable mach'y to order. Foot lathe catalogue for stamp. E. O. Chase, Newark, N.J.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York

Consulting Engineer and Mechanical expert, C. C. Hill, 84 Market street, Chicago, Ill.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Cooper, On the Use of Belting, $3.50. Edw. Meeks, Publisher, 1002 Walnut St., Phila., Pa.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

A few chucks, of all kinds, for sale at half price Slightly damaged. Send for list to the maker, A. F. Cushman, Hartford, Conn.

The outline ("wax process") engravings shown in the AM. MACHINIST each week are made by Struthers, Servoss & Co, 32 Frankfort Street, N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

Improved Tack Machinery, made by The Willets Man'f'g Co., can be seen in operation at their works, 57 Clifford St., Providence, R. I.

The Complete Practical Machinist, $2.50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

EXTRACTS FROM CHORDAL'S LETTERS, 400 pages, 12mo., handsomely bound in cloth. New and enlarged edition, with over 50 illustrations. Price $2. Published by John Wiley & Sons, 15 Astor place, New York.

Locomotive Engine Running and Management. By Angus Sinclair. Price $2, An excellent book for men interested in steam engineering, valve setting, designing valve motion, the care of the Westinghouse brake, etc. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Useful Information for Steam Users—A 100-page pamphlet, on the care and management of the steam engine and boiler, with hints and rules for engineers and firemen. Every engineer should have this book. Send 25c. in P. O. stamps to the J. N. Mills Publishing Company, 145 Broadway, N. Y.

MANUFACTURES

The Brownwood (Tex.) Ice Company are building a factory to cost $20,000.

J. S. Groves and others, Greenville, S. C., have commenced the manufacture of hoes.

The Bardstown (Ky.) Axe Handle Company will establish a factory with new engine and machinery.

Henry Raabe will erect a two-story factory on 64th Street, near 11th Avenue, New York, to cost $12,000.

The Huntingdon (Pa.) Machine Shop was burned out February 7. They inform us they will build on a new site as soon as possible.

A new foundry and machine shop is about to be established at Athens, Ga. Major Green, of Athens, is at the head of it.

C. Hodgkins & Sons, machinists, of Marlborough, N. H., are to manufacture a mowing machine on which they hold the patent.

The Jones Car Works have been incorporated at Schenectady, N. Y., with $50,000 capital. The works will be kept in operation.

The Chicago Rubber Company, Grand Crossing, Ill., are now rebuilding their factory. One building is 120x32 feet; another 50x40 feet.

Nagle & Homan will erect a three-story brick factory on Van Buren Street, near Stuyvesant Avenue, Brooklyn, N. Y., to cost $5,000.

The Melvern Machine Shops, Roberts Bros., proprietors, Melvern, Kansas, expect to make some additions to their plant in the near future.

J. H. Wells has recently opened a machine shop at Tampa, Fla, being the only one within a radius of 100 miles of that place. A new addition is being built.

The Pratt Manufacturing Company (a branch of the Standard Oil Company) will erect a $15,000 packing box factory on North 12th Street, Brooklyn, N. Y.

The Madison Oil Mills., Canton, Miss, Carroll Smith, President, will enlarge their plant to almost double the present capacity, and purchase new machinery.

P. Prybill, 461 West 40th Street, New York, manfacturer of wood-working machinery, will erect a new seven story machine shop in that locality, to cost $50,000.

Lehr Brothers, Fremont, Ohio, manufacturers of agricultural implements, are making arrangements to enlarge their works. They will also add some new machinery.

Francis Kell, 163 East 53d Street, New York, will erect a new foundry on Courtland Avenue, 100x32 feet, with extension 10x50 feet. It will cost $6,000 for the building.

The Gibson-Lee Manufacturing Company, Chattanooga, Tenn., will more than double the capacity of their stove foundry. Will erect a moulding room 60x135 feet.

Two or three large Bessemer Steel Works, that have been shut down for lack of orders, have started up again, thus giving employment to hundreds of workmen.

H. Anshutz & Co, stove manufacturers, are taking steps toward increasing their capacity. They are building a large addition to their already extensive foundry in Allegheny, Pa.

S. M. Mills, of Bremaker, Moore & Company, Louisville, Ky., contemplates starting a paper mill in Knoxville or Chattanooga, and is investigating the advantages of these places.

A company has been organized at Ithaca, N. Y, for electric lighting, using the Brush system. Their motive power will consist of two Ball Engines, of 60 H.-P. each, and two steel boilers.

The National Scale Convention of the Amalgamated Iron and Steel Association will meet in Pittsburgh, March 4. Each district elects a representative or representatives to attend the convention.

Fred. Visscher, of Mt. Sterling, Ky, will start a factory for the manufacture of tobacco knives at Mt. Sterling, Montgomery County, Ky. He has orders for 40,000 to be delivered before next tobacco season.

The *Boston Bulletin* says the two co-operative hat factories in Norwalk, Conn., have begun business, and a line of hats is being made which are pronounced superior to any ever before produced in that city.

T. A. Snow, Chattanooga, Tenn., who has been manufacturing wrought-iron ranges for some time, has purchased a new building, which will be fitted with complete machinery for making ranges, laundry stoves, etc.

Citizens of Canton, Ohio, have raised a sufficient amount to retain the hardware manufacturing works of Ebel, Gilliam & Company, recently burned, despite the efforts of Youngstown, Crestline, Richmond, Ind., and other places to secure them.

Breckenridge & Company will take up the business dropped by the force pump company at Westfield, Mass., and in addition do general machine work, and also manufacture one or two new articles. The firm consists of M. P. and L. P. Breckenridge.

The South Halsted St. Iron Company, of Chicago, Ill., formerly Vanderkloot & Son, has been incorporated to do a general foundry business. Capital stock, $50,000. Marinus Vanderkloot, Andrian Vanderkloot, and Mathias R. Vanderkloot, incorporators.

C. E. Lipe, Syracuse, N. Y., reports sales of his milling machines, within a few days, to Ames Iron Works, Oswego, N. Y., and Cooper Bros., Cortland, N. Y. Inquiries are much more numerous since the first of the year than for a long time previously.

W. P. Davis, North Bloomfield, New York, manufacturer of key seat cutters and upright drills, writes us: "We have just started on enough work to run until May 1, and find our improvements are of much help to us, being able to turn out work much faster."

Herbert C. Ayer, former president of Brown, Bonnell & Company, is said to be at present in London leading a quiet, retired life, An iron manufacturer predicts that within a year Mr. Ayer will be in the Mahoning Valley again at the head of a large manufacturing establishment.—*Youngstown News Register.*

W. H. Withgott and Bros., Easton, Md., have published a 60-page illustrated catalogue of engines, boilers, and steam users' specialties; also sawmills and threshing machines. They are manufacturers and dealers in all kinds of machinery. Several pages of general information for steam users and manufacturers are given.

The Pioneer Iron Works, Brooklyn, N. Y., are doing considerable business in building the Zell Safety Water Tube Boiler. In addition to the nine now building, they have received orders from the Zell Guano Company for 200 horse-power; the Ohio Edison Light Company for 50 horse-power, and for 150 horse-power to go on a sugar plantation in Cuba.

The John T. Noye Manufacturing Company, Buffalo, N. Y., have issued a "Catalogo Illustrado E Descriptivo Do Moinho Seccional Para Farinha;" or, in United States language, an illustrated catalogue of the Rounds Sectional Roller Mill. It is interesting mainly to those who read and speak Spanish, but the mill itself grinds just as well in any other language. A long list of users of the mill in twenty different States is included in the catalogue.

James Brown, Comptroller of Allegheny City, Pa., will receive orders for pumping engines of a capacity to lift 1,000,000 gallons of water 400 feet high in 24 hours. Piston speed not to exceed 75 ft. per minute; style, double-acting plunger pattern, outside packing. Proportion of steam to water cylinder, four to one. Contractor to furnish plans and specification, with proposal and guarantee. The engine is to be erected on foundation furnished by the city, and the work to be done by July 1.

J. McCallum Manufacturing Company, South Elgin, Ill, was incorporated January 9, 1885, with a capital of $250,000 The foundry and machine shops will be started very soon, and will be run principally on their patent specialties, employing about 100 men. This company succeeds to the business of the J. McCallum & Bros. Manufacturing Company, and will continue the manufacture of the McCallum wagon specialties. The main building is 40x120 feet, and the foundry 45x100 feet.

The Keystone Spike Works, of Alliance, Ohio, says the *Iron Trade Review*, will soon have in running order a machine for forging spikes or cylinder teeth for threshing machines, so that they will need no dressing—that is, there will be no "fins" left. The improved machine consists of a clamp to hold the rod, and four hammers at right angles, so arranged by cam movement that the two opposite hammers drop at the same time. The company also make a full line of machine-forged keys

The Union Foundry and Pullman Car Wheel Works, Chicago, Ill., have published a manual illustrating their patterns of architectural and iron work, which contains a large assortment of information for the use of architects, engineers, draftsmen and builders. The manual is well printed, and is bound in very convenient form for carrying in the pocket. The intention of the company is to give the manual free to their customers and friends. The works turn out a very great diversity of castings, but they make a specialty of the iron required in architectural operations. Many of the patterns shown in the manual are beautifully designed, yet strength seems in no case to be sacrificed to elegance. There are tables giving the strength of iron in numerous different forms, and many interesting particulars are given in the way of notes Among these is an excellent article headed "A Few Hints About Sound Castings and Factors of Safety," written by C. W. Trowbridge, engineer. This article will be read with interest and profit by every one interested in any kind of work where castings are used.

Among the recent sales made by the National Pipe Bending Company, of New Haven, Conn., of their National Feed Water Heater are the following; Fairbanks & Co., Albany, N. Y., 60 H.-P.; J. B. Cloudsley, Toronto, Ont., 2 heaters; Capt. E. D. Williams, Wilmington, N. C., 50 H.-P.; Kimball House, Atlanta, Ga., 150 H.-P.; Plymouth Woolen Company, Plymouth, Mass., 200 H.-P.; Excelsior Electric Light Company, Port Huron, Mich., 80 H.-P.; Norwich Electric Light Company, Norwich, Conn., 100 H.-P.; Fairbanks & Co., St. Louis, Mo., 150 H.-P.; Shatto & Dennis, Minneapolis, Minn., 60 H.-P.; Pettit Machine Works, Newton, Mass, 50 H.-P.; Canfield Rubber Company, Bridgeport, Conn., 100 H.-P.; J. B. Savage, Southington, Conn., 100 H.-P.; Steamer Florence, Bridgeport, Conn., 50 H.-P.; Sperry & Barnes, New Haven, Conn., 150 H.-P.; Waterbury Buckle Co., Waterbury, Conn., 80 H.-P.; Fairbanks, Morse & Co., Chicago, Ill, 150 H.-P.; D. J. Murray Manufacturing Co., Warsaw, Wis., 50 H.-P.; French, Hall & Co., Rockland, Mass., 40 H.-P.; New Haven Electric Light Co., 150 H.-P.; Lymansville Co., Providence, R. I., 500 H.-P.; Merwin McKaig, Cumberland, Md., 60 H.-P. They are now getting out a 500 H.-P. heater for an electric light station, and one of 300 H.-P. for Myers & Co, Beaver Falls, Pa, and in addition are making two iron coils, 8 foot high, for an ice machine, and 550 refrigerator bands for the De La Vergne refrigerating machine company.

The Oneida (N. Y.) Steam Engine and Foundry Company write us: We have lately added to our list of Little Giant Improved Chucks, three more sizes, viz, Nos. 2½, 3, and 4.

No. 2½ is put in as a substitute for the No. 2, where the work is extremely heavy. The screws are made larger in every way, especially in the center. The teeth in the jaws are heavier, and the key larger, with a longer lever. We have aimed to make this a chuck which will stand all the strain which can reasonably be required of it. The No. 3 and No. 4 are intended for large, heavy work. The No. 3 will hold from 0 to 1½″, and is 6″ in diameter. The No. 4 will hold from 0 to 2″, and is 6½″ in diameter. These chucks are provided with set-screws on the sides, which are intended to be used when the work is extremely heavy, like holding boring bars in boring mills, etc. They are also good cutting-off chucks, and for that purpose are much more handy than the cutting-off chucks which have gears and pinions, not being so likely to get broken, and not being so great in diameter. These chucks (Nos. 3 and 4) are at present made straight body for face plates, which is the most suitable style for every class of work, being shorter in body and most easily fitted to any machine. We have been urged by manufacturers to make a little giant improved which will hold a 2″ drill or bar, and orders have been given ahead to induce us to make them, and we now think we have something which will meet their wants. We have just received an order lot of 3 and 4 from England, where we sent a photograph a short time since. Trade is picking up some, and it looks as though we will have all we can do to meet the demands for our chucks.

Machinists' Supplies and Iron.

NEW YORK, February 12, 1885.

There is no notable change in the condition of the supply trade.

Iron.—The market for pig continues steady. Standard Lehigh Valley brands have sold in small lots, at $18 to $18.50 for No. 1 X Foundry at tide water; $17 to $17.50 for No. 2 X.

Scotch pig continues dull and nominal. We quote for Shotts, $21.50 to $21.75; Coltness, $21.50 to $21.75; Glengarnock, $19.50; Gartsherrie, $20.50; Summerlee, $20.50; Carnbroe, $19—all to arrive.

Copper ingot has been quiet and steady. Jobbing sales of Lake have been made at 11 to 11¼ cents.

Tin—The market for spot is firm, with moderate demand. We quote for jobbing lots: Banca, 18½ cents; Straits and Malacca, 17.40 to 17.55 cents.

WANTED

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Experienced and practical draftsman wants permanent position. Ad. "Square," AM. MACHINIST.

Situation wanted by an iron foundry supt. or foreman. Adddress Iron Founder, AM. MACHINIST.

Wanted—Experienced man to run roll grooving and grinding machines. Address T. W., care AM. MACHINIST.

Mech. engineer, of good address and experience, wishes to travel part time for good firm. Address Box 2, AM. MACHINIST.

An experienced engineer desires a position as chief draftsman or superintendent. Address N. S. S., AM. MACHINIST.

Practical foundryman wants position as supt. or foreman. 25 years experience in machinery and building work. Would like to buy interest in the business. Address BOX 4, AM. MACHINIST.

Wanted—Steady situation by a practical machinist accustomed to marine and heavy engine work, inside or outside. Ad. J. S., 862 West St., Phila., Pa.

An American, 40 years of age, an earnest, accomplished mechanic, desires to engage as foreman or instructor on tools and complicated standard work. Address H. W. P., AM. MACHINIST.

Machine shop foreman wanted. One who is active, and fully competent to take full charge of a shop in all its details. Address with age, experience, reference, wages expected. E, care AM. MACHINIST.

Wanted—A traveler; must be posted in steam engines, and some experience in traveling. Good salary and permanent employment to the right man. No other need apply. Address "Governor," AM. MACHINIST.

Wanted—Position as manager, superintendent or designer, by Mechanical Engineer who has has had a technical education and ten years' practical experience in mechanical work and the above positions. Best references. Ad Box 15, AM. MACHINIST.

Wanted—Working supt. for shop making special high-class machine tools. Must have practical and progressive ideas; capable of handling his dept. to make money and be an accurate inspector of work. Address, giving age, past experience, references, and salary expected, Western, AM. MACHINIST.

Foundryman wanted as foreman or contractor. Annual melt 1,200 to 1,500 tons. Character of work largely agricultural, with some machinery castings. Best of references will be required. This application from a large concern not far from Chicago, and I believe it to be a good opportunity to the right party. Written communications only will be received. Address S. E. Bliss, 89 Lake St., Chicago, Ill.

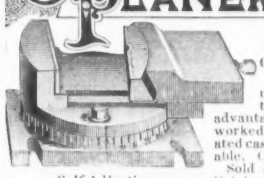
Valuable patent on a household article for sale. Send for description, etc. to J. A. Cupler, Box 106, Dallas City, Pa.

Wanted—The address of machinists prepared to manufacture in quantities a steel tool 7 inches long, blade tempered and part of same brought to cutting and scraping edge. Wm. W. Yonge, Personal, Chattanooga, Tenn.

For Sale—Foundry and Machine Shop in city of 3,500 inhabitants. No competition east or west for 100 miles. On St Louis Air Line R. R. This can be bought at a bargain. Address James B. Gamble, Princeton, Indiana.

Wanted—Iron planer, about 30 or 32 wide, in exchange for new or second-hand engines, 6 to 12-inch cylinders, drill press and other machines. Will make it interesting to party having good tool to make this exchange. Logan Machine Works, Oil City, Pa.

STEPHENS PATENT PLANER CHUCKS



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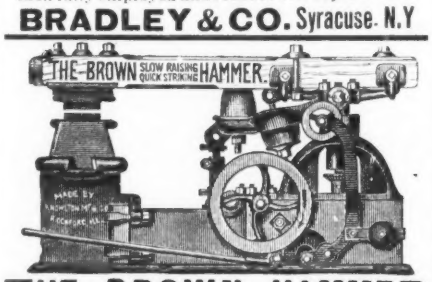

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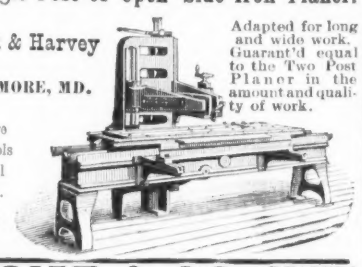

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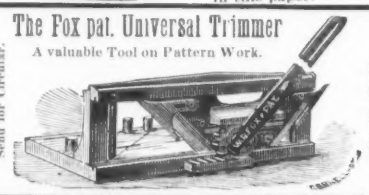

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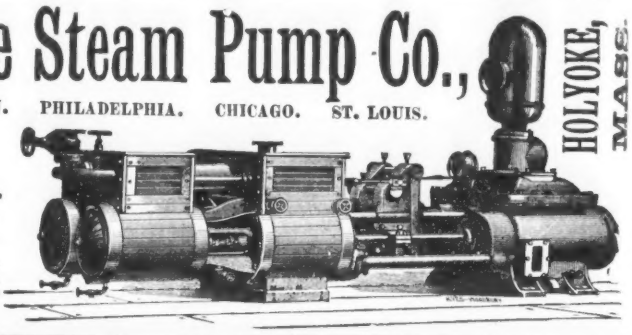

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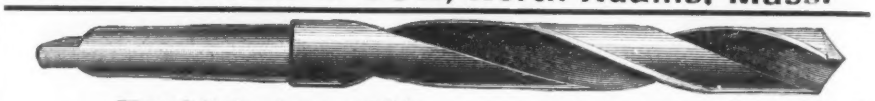

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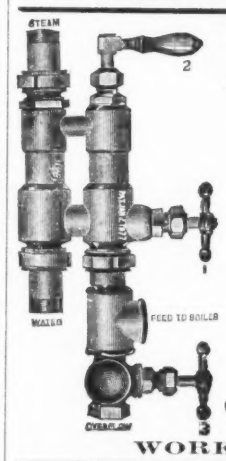

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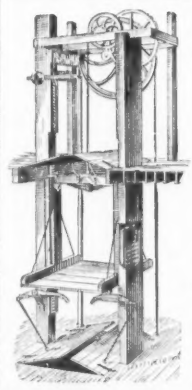

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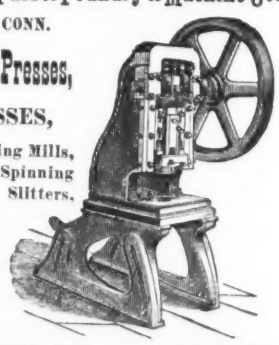

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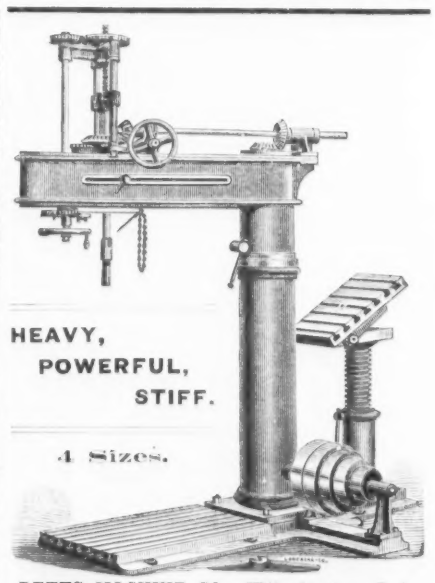

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4 Engine Lathes, 14 in. x 6 ft., Rexford.
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1 Planer, 22 x 22 x 4 ft., Putnam.
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1 Planer, Pond's, 72 in. x 72 in. x 30 ft.
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1 " " 32 in. x 17½ ft. "
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1 " " 28 in. x 9½ ft. "
2 " " 26 in. x 10 ft. "
2 " " 22 in. x 8 ft. "
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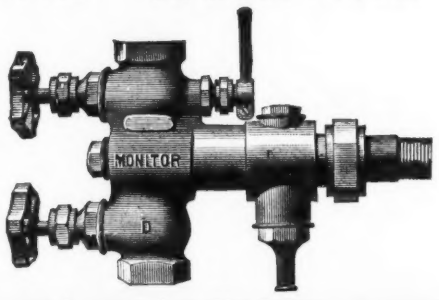

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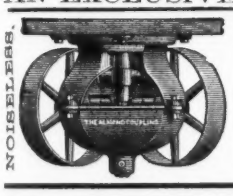

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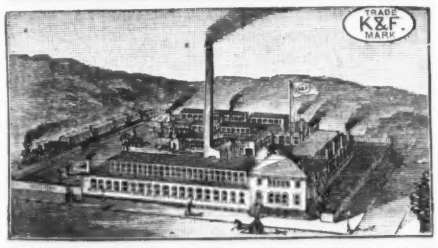

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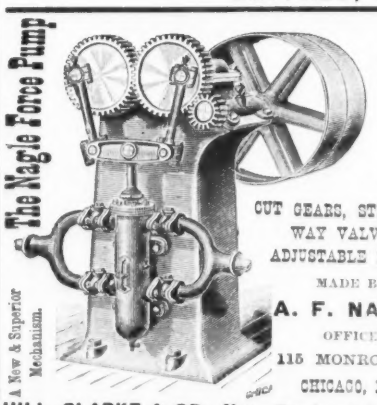

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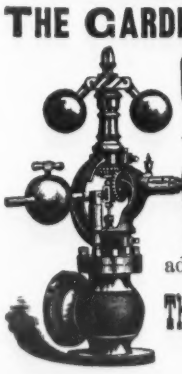

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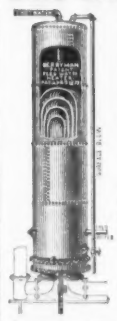

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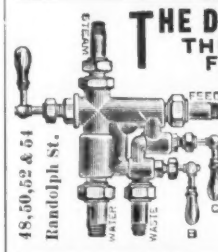

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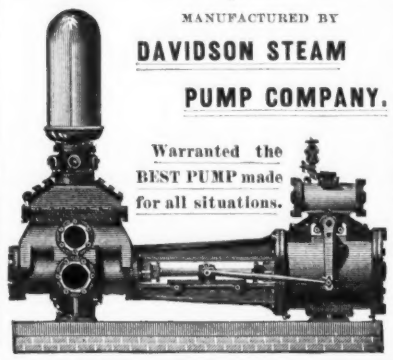

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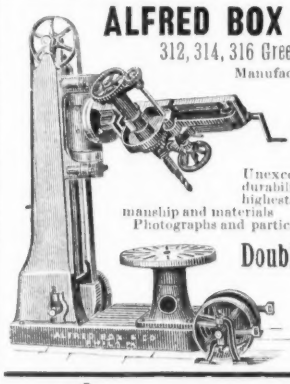

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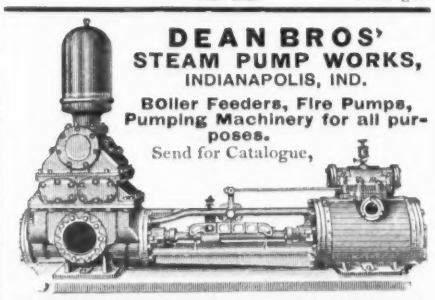

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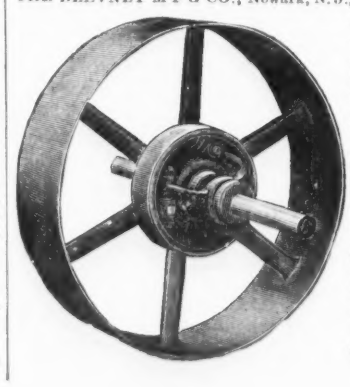

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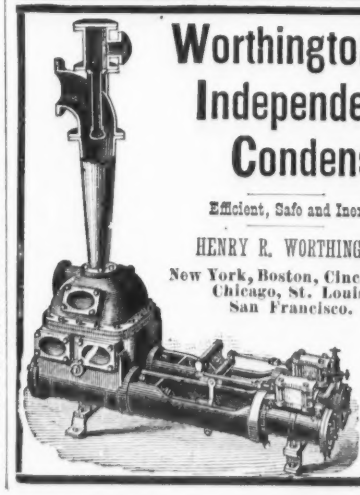

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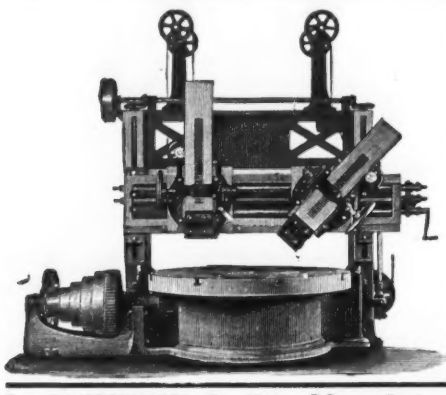

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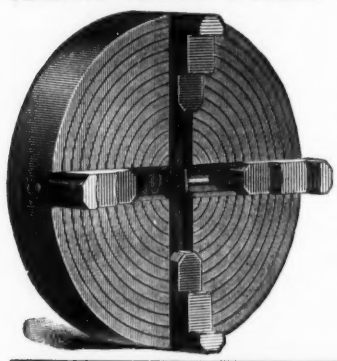

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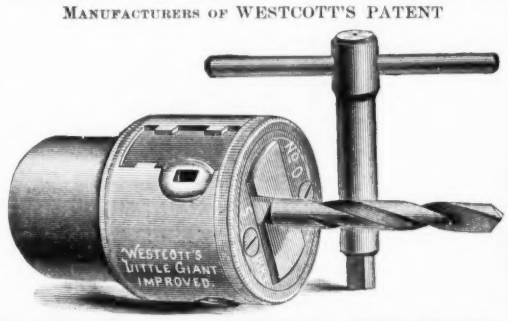

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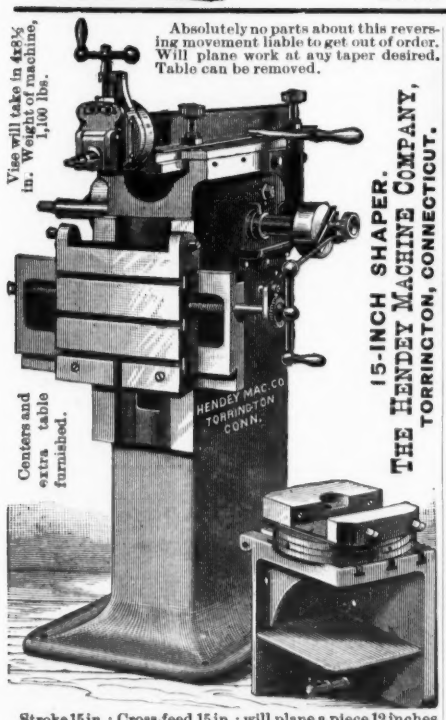

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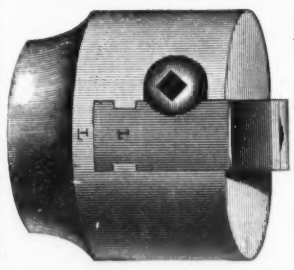

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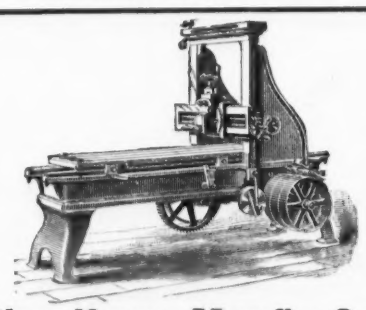

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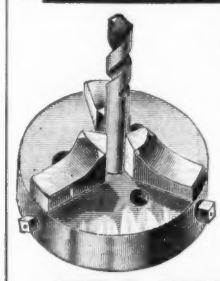

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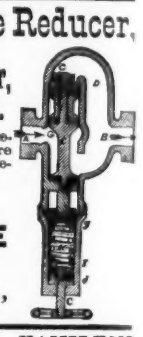

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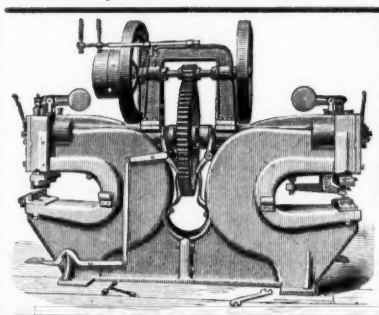

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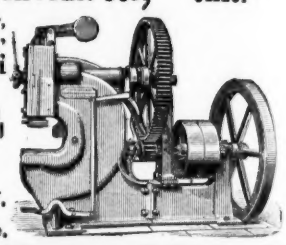

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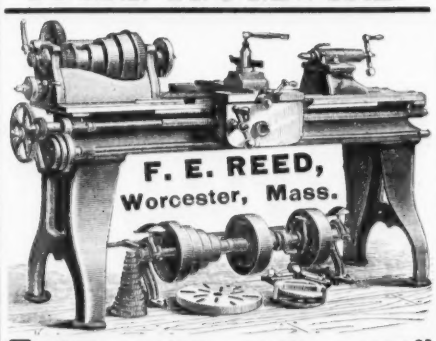

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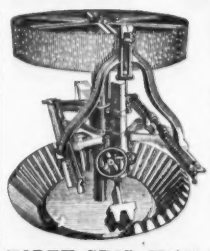

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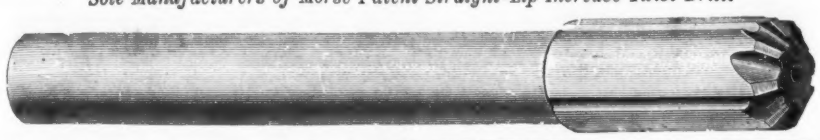

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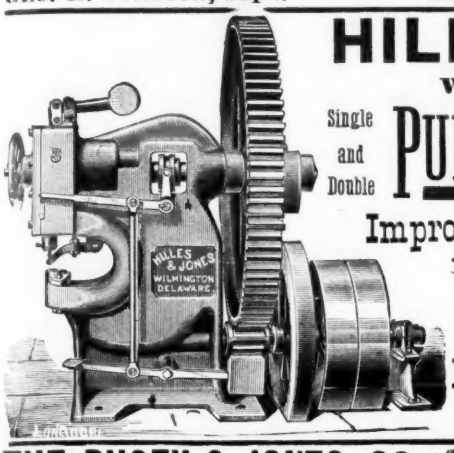

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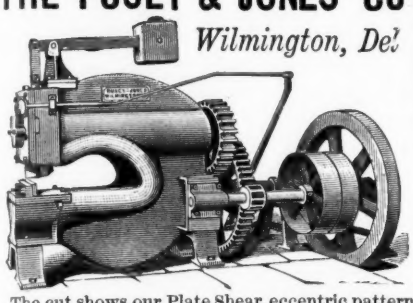

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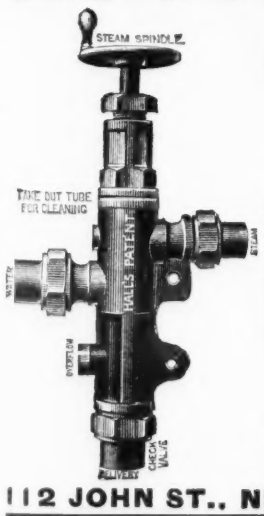

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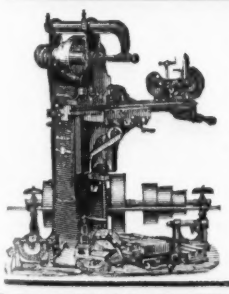

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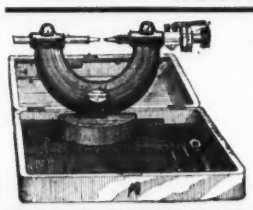

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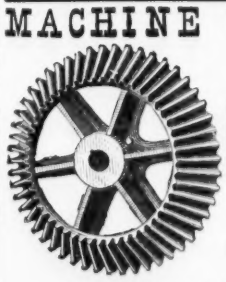

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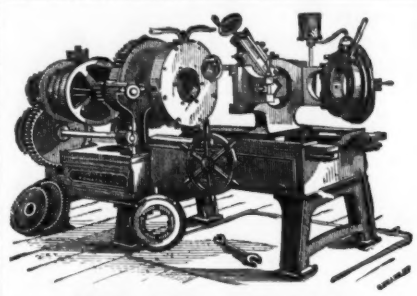

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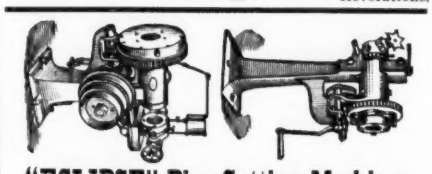

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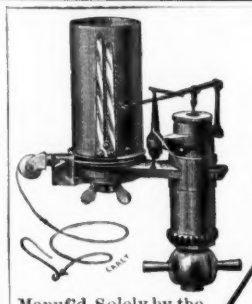

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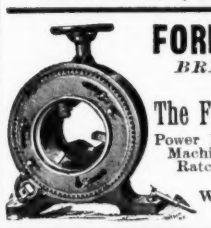

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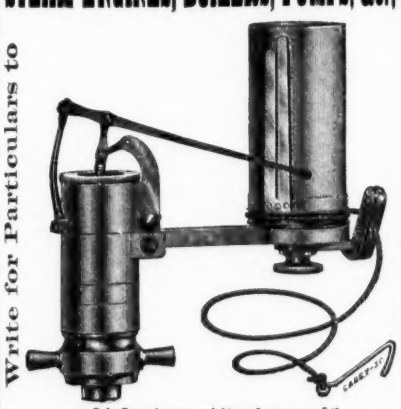

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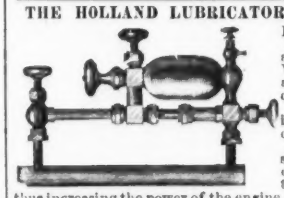

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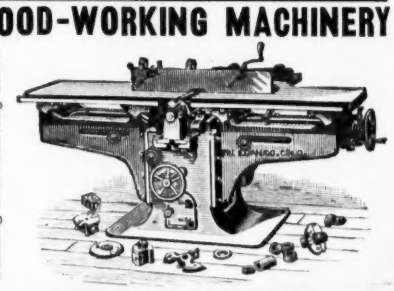

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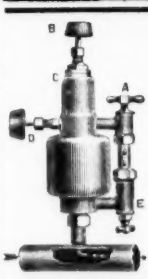

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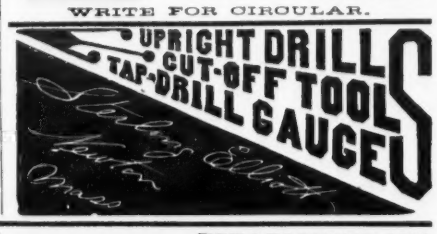

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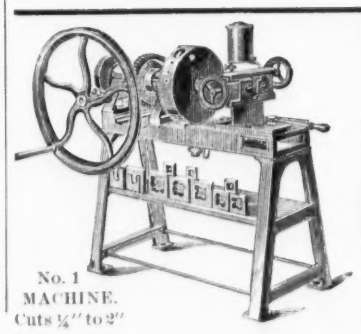

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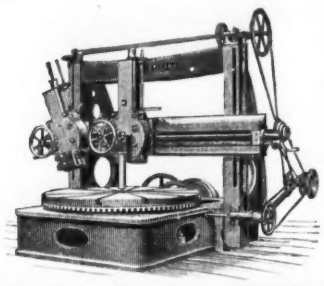

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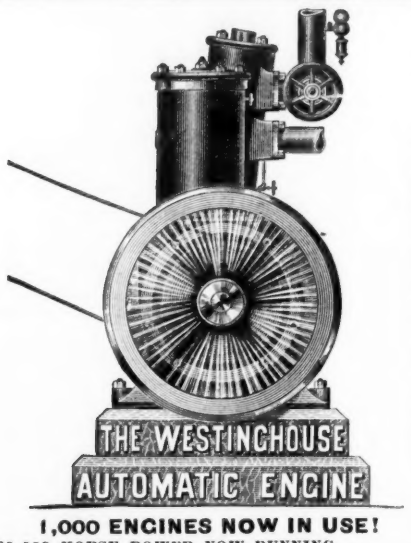

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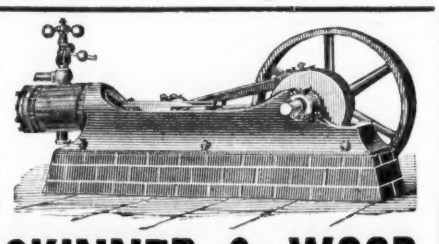

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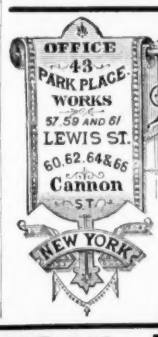

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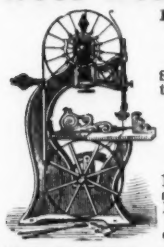

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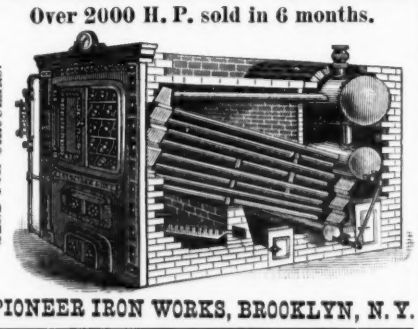

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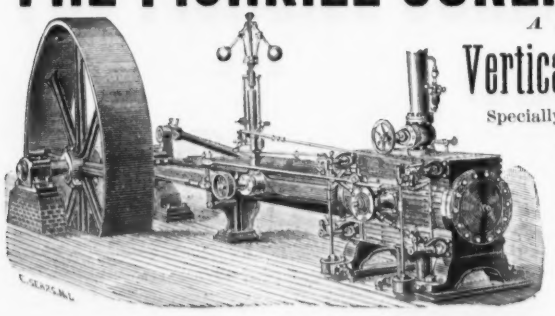

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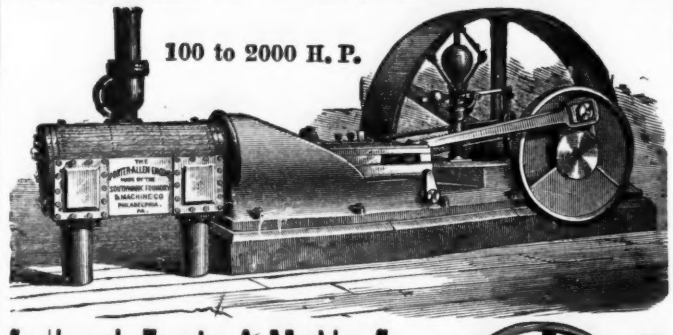

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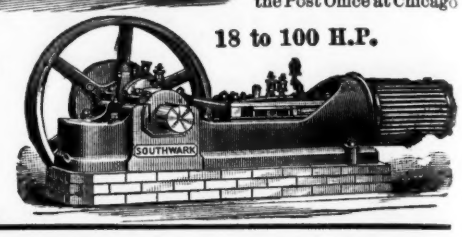

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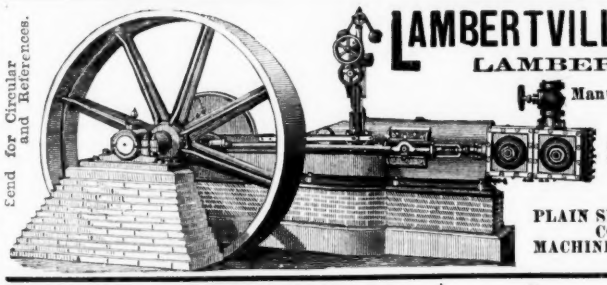

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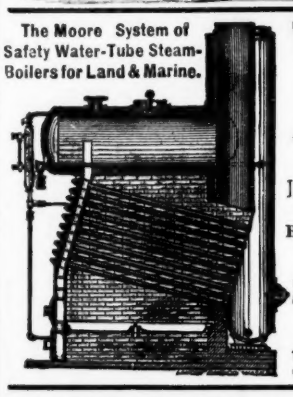

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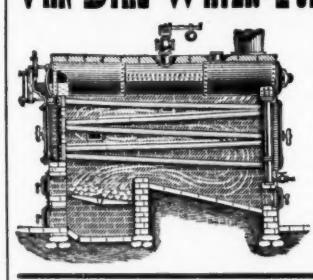

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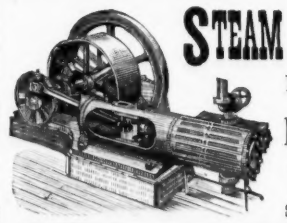

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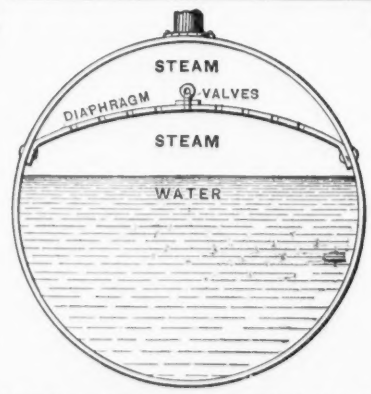

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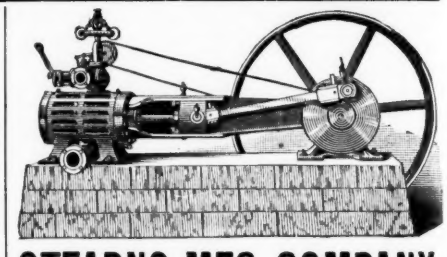

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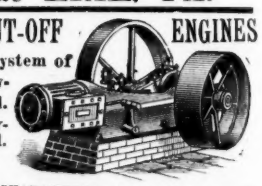

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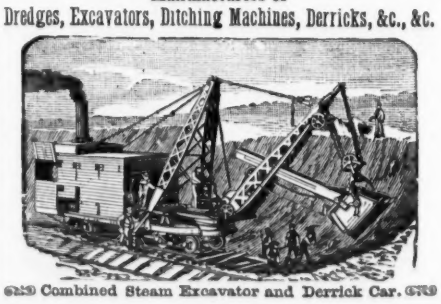

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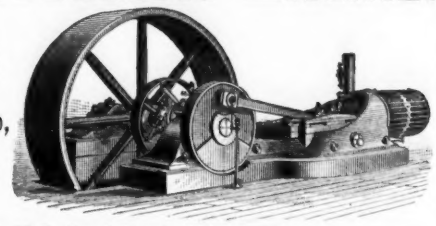

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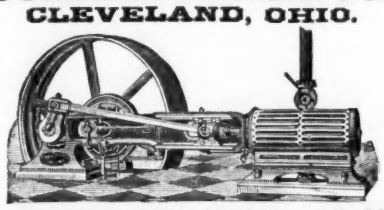

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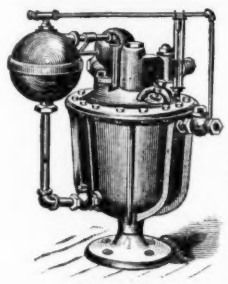

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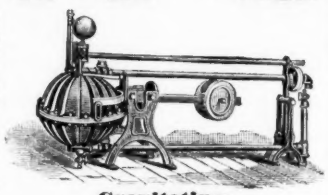

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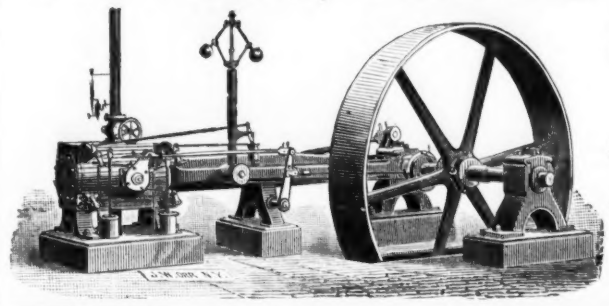

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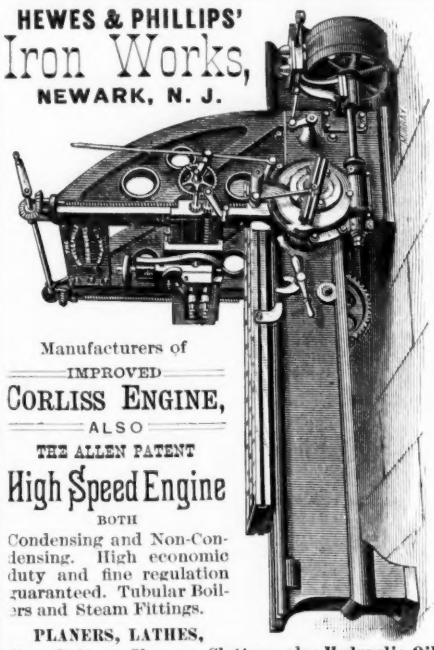

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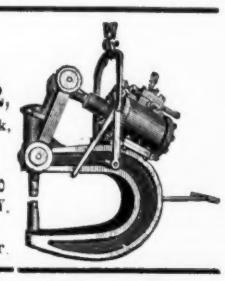

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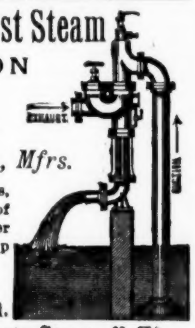

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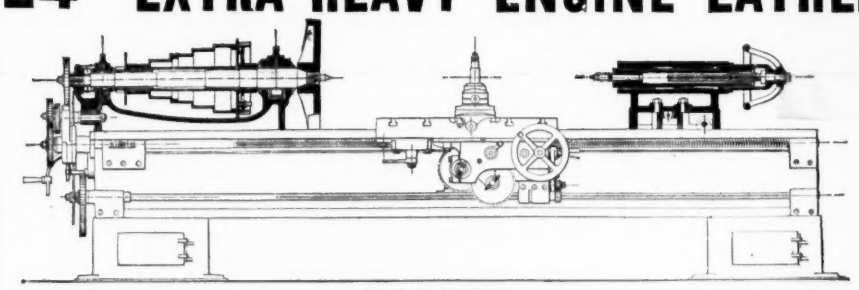

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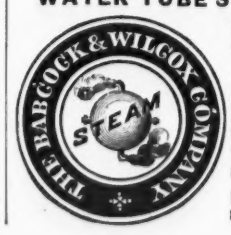

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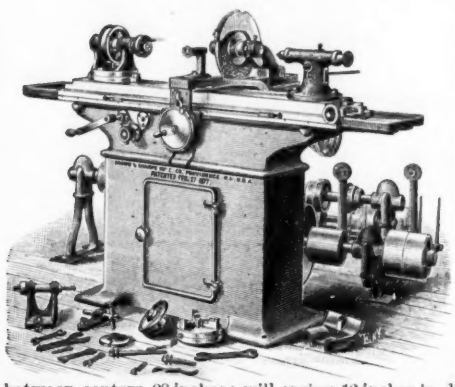

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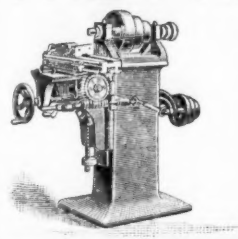

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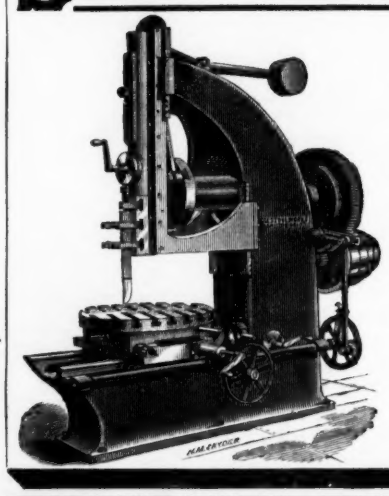

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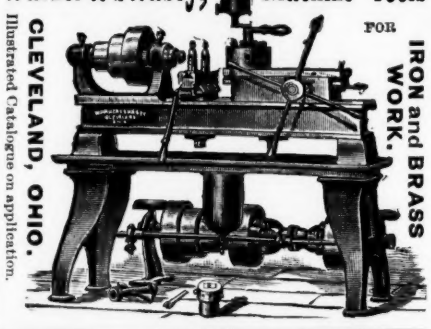

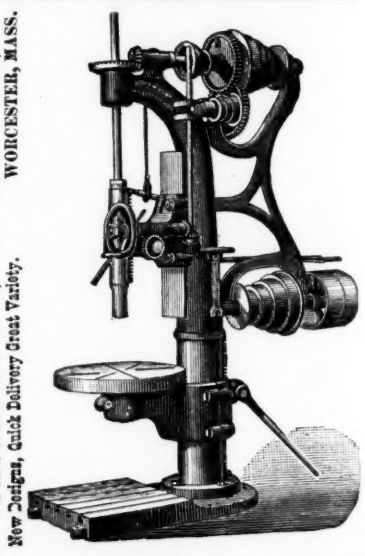

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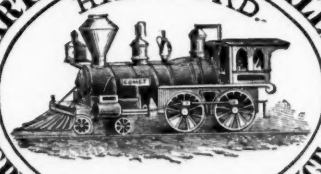

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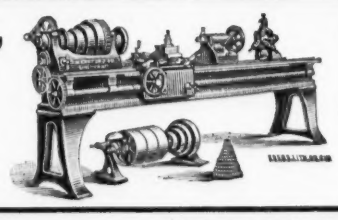

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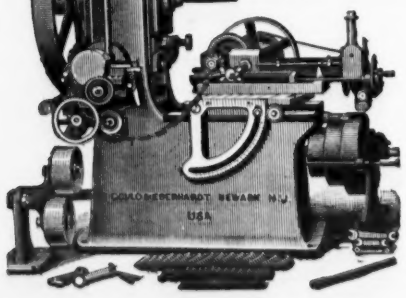

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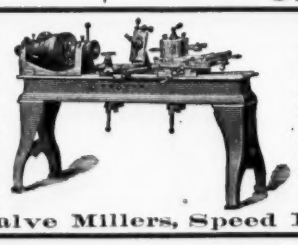

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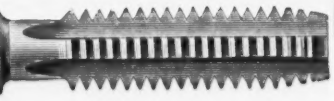

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